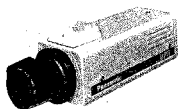


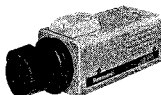
Service Manual

Colour CCTV Cameras

WV-CL320/WV-CL322/WV-CL324



WV-CL320



WV-CL322



WV-CL324

SPECIFICATIONS

Pick-up Device:	681 (H) × 582 (V) pixels, Interline Transfer CCD
Scanning Area:	6.6 (H) × 4.9 (V) mm (Equivalent to scanning area of 1/2" pick-up tube)
Synchronization:	Internal sync at INT position for WV-CL320 and WV-CL324 Line-locked sync at LL position for WV-CL320/WV-CL324 Internal sync only for WV-CL322
Scanning System:	2 : 1 Interlace
Scanning:	625 Lines/50 Fields/25 Frames
Horizontal:	15.625 KHz
Vertical:	50 Hz
Horizontal Resolution:	430 lines at center
Video Output:	1.0 Vp-p PAL composite, 75 ohms/BNC connector
Signal to Noise Ratio:	46 dB (AGC OFF, Y signal)
Automatic Light Compensation:	ALC: 1 : 26,000 with F1.4 ALC Lens
Electronic Light Control:	Equivalent to continuous variable shutter speed between 1/50 sec. and 1/15,700 sec.
Minimum Illumination:	0.3 footcandle (3 lux) at F1.4 (AGC ON) 0.09 footcandles (0.9 lux) at F0.75 (AGC ON) with WV-LA608 lens
Gain Control:	Selectable AGC ON (+14 dB) or OFF
Lens Mount:	C-mount or special C-mount (CS-mount)
Ambient Temperature:	-10°C - +50°C
Power Source:	WV-CL320/A, WV-CL320/B : 240V AC 50 Hz, 5.5W WV-CL320/G : 230V AC 50 Hz, 5.5W WV-CL322E : 12V DC, 0.39A WV-CL324E : 24V AC, 5.3W
Dimensions (Excluding lens):	WV-CL320/WV-CL324 : 70 (W) × 70.5 (H) × 166 (D) mm WV-CL322 : 70 (W) × 70.5 (H) × 141 (D) mm
Weights (Without lens):	WV-CL320 : 0.86 kg WV-CL322 : 0.57 kg WV-CL324 : 0.73 kg

Panasonic

Standard Accessories

- o ALC Lens Connector (YFE4181J100) 1pc.
- o Body Cap 1pc.

Optional Accessories

- o Lenses:
 - WV-LA4510, WV-LA608, WV-LA1208,
 - WV-LZ81/10, WV-LZ81/6, WV-LZ80/2,
 - WV-LZ83/6, WV-LA28, WV-LA4R5A,
 - WV-LA6A, WV-LA12A, WV-LA18, WV-LA36,
 - WV-LM4R5A, WV-LF6, WV-LF12

Weights and dimensions shown are approximate.
Specifications are subject to change without notice.

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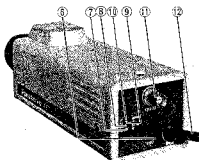
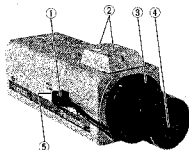
	CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN			This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.				This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

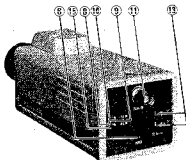
There are special components used in this equipment which are important for safety. These parts are indicated by the "⚠" mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent shock, fire, or other hazards.

Do not modify the original design without permission of manufacture.

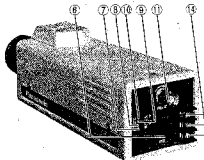
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS



WV-CL320



WV-CL322



WV-CL324

(1) Auto Iris Lens Connector

This 4-pin female connector supplies the power and either video signal or DC control signal to the auto iris lens.

A 4-pin male connector, which can be mated with the camera's female connector, is supplied as a standard accessory (Part No. YFE4191J100).

This male connector can be installed on lenses which have incompatible type connector.

See page 13 for installation details.

(2) Camera Mounting Screw Hole

This threaded hole (1/4" - 20) is used to mount the camera onto a mounting bracket or tripod.

(3) Flange-back Adjusting Ring

This ring is used to adjust the back focal length or picture focus by rotating this ring to clockwise for C-mount lens or counterclockwise for special C-mount (CS mount) lens.

Cautions:

1. Always set this ring to fully clockwise before mounting the lens.
2. Do not turn this ring too much to counterclockwise when the C-mount lens is mounted as this could damage the inner glass and CCD image sensor.

(4) Lens (Option)

(5) Lens Selection Switch (AUTO IRIS, DC/VIDEO)

This switch is used to select the supplied auto iris control signal to the lens through the Auto Iris lens Connector (1).

DC:

Choose this position when the auto iris control lens requiring DC control signal such as WV-LA4510, WV-LA608, WV-LA1208, WV-LZ81/10, WV-LZ81/6, WV-LZ80/2, WV-LZ83/6, WV-LA28, WV-LA4R5A, WV-LA6A, WV-LA12A, WV-LA18, WV-LA36, WV-LM4R5A, WV-LF6, WV-LF12 is mounted on the camera.

VIDEO:

Choose this position when the auto iris control lens requiring video signal such as WV-LA88, WV-LA16B, WV-LA25B, WV-LA50B, is mounted on the camera.

(6) Power Indicator

(7) Sync Selection Switch (INT/LL) (WV-CL320 / WV-CL324)

This switch is used to select the camera synchronization mode.

INT:

The camera synchronization mode is set to internal 2:1 interlace.

LL:

The camera synchronization mode is set to Line-lock.

(8) Backlight Compensation On/Off Switch (BLC ON / OFF)

When backlight affects the picture, set this switch to "BLC ON" position for obtaining a clear picture.

See page 7 for more details.

NEW FUNCTIONS

(9) Electronic Light Control/Automatic Light Control Selection Switch (ELC / ALC)

See page 7 for more details.

ALC:

Choose this position when using an auto iris lens.

ELC:

Choose this position when using a fixed or manual iris lens.

(10) AGC ON/OFF Switch (AGC ON/OFF)

This switch is used to select the gain of the video amplifier as follows;

ON:

When the lens iris is fully opened under a low light condition, a clear picture is obtained by automatic increase of the gain.

OFF:

A natural and low-noise picture is obtained under a low light condition.

When adjusting the auto iris control lens requiring video signal such as WV-LA8B, WV-LA16B, WV-LA25B, WV-LA50B, set this switch to "OFF" and adjust ALC for proper level.

(11) Video Output Connector (VIDEO)

A composite video signal is provided via this connector.

(12) Power Cord**(13) DC 12V In Terminal (DC 12V IN)**

This terminal accepts 12V DC power source (10.5V-16V).

(14) AC 24V In Terminal (AC 24V IN)

This terminal accepts 24V AC power source (19.5V - 28V). Be sure to connect grounding lead to the GND terminal.

(15) Auto Tracing White Balance Control On/Off**Switch (ATW, ON/OFF)**

When the Auto Tracing White Balance Control (ATW) On mode is selected, the white balance is automatically and continuously set by detecting the characteristic/colour temperature of light source through the lens and controlling the gain of red and blue signal even if the characteristic/colour temperature varies.

When the Auto Tracing White Balance Control (ATW) Off mode is selected, the white balance is automatically set and fixed by detecting the characteristic/colour temperature of light source through the lens and controlling the gain of red and blue signal.

Notes:

- When the colour temperature is changed in the Auto Tracing White Balance Control Off mode, set this switch to ON position. Then set this switch to OFF position.
- Set this switch to the ON position when the Electronic Light Control mode is selected because the colour temperature changes by the shutter speed.

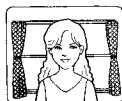
1. ELC (Electronic Light Control)

In this mode a continuously variable electronic shutter is employed to automatically control exposure times in the CCD Image Sensor, according to the incoming light level. With this mode selected, fixed or manual iris lens can be used instead of an ALC type lens.

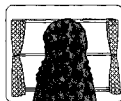
Cautions:

- Under bright conditions such as outdoors, use an ALC type lens as the ELC control range is not wide enough under these conditions.
- Under certain unique lighting conditions, the following may appear:
 - A strong smear and/or blooming on high light objects such as spot lights or windows.
 - A noticeable flicker in the picture and/or the colour rendition variations.
 - A periodic variance of white balance.
 Should these phenomena occur, use an ALC lens.
- When using in the ELC mode with a fixed iris lens, the depth of field of the image may be less than that of obtained by using an ALC lens. Depth of field varies inversely with the iris opening. Thus, using this camera in the ELC mode with the fully opened fixed iris lens will result in less depth of field compared with using an ALC lens.

(And distant objects in the picture might not be in focus.)

2. BLC (Back Light Compensation)

ON



OFF

When strong, unwanted background lighting interferes with the clarity of important centre objects, turn this switch to the "ON" position.

Cautions:

- Setting this switch to the "BLC OFF" position is recommended in the use with the pan/tilt head or in the object having the rapid change illumination, since the speed of lens iris becomes slow in the "BLC ON" position.
- If the desired objects are not in the centre of the picture, backlight compensation may not work effectively.

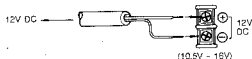
CONNECTION

A. WV-CL320

1. Connect the AC Power Cord (12) to a electrical outlet.

B. WV-CL322

1. A power supply of 12V DC is required.
2. Connect the power cable to the 12V DC Power Terminal (13) on the rear panel of the camera.



Resistance of copper wire (20°C)

Copper wire size (AWG)	#24 (0.22mm ²)	#22 (0.33mm ²)	#20 (0.52mm ²)	#18 (0.83mm ²)
Resistance ohms/ft	0.257	0.165	0.099	0.059
Resistance ohms/m	0.078	0.050	0.030	0.018

- Calculation method of maximum cable length between camera and power supply.

$$10.5V \leq V_A - (R \times 0.42 \times L) \leq 16V \text{ DC}$$

L: Cable length (meter)

R: Resistance of copper wire (ohm/m)

V_A: DC voltage of power supply

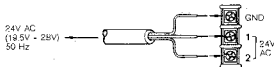
$$L_{\text{standard}} = \frac{V_A - 12}{0.42 \times R} \text{ (Meter)}$$

$$L_{\text{minimum}} = \frac{V_A - 16}{0.42 \times R} \text{ (Meter)}$$

$$L_{\text{maximum}} = \frac{V_A - 10.5}{0.42 \times R} \text{ (Meter)}$$

C. WV-CL324

1. A power supply of 24V AC 50Hz is required.
2. Connect the power cable to the AC 24V In Terminal (14) on the rear panel of the camera.

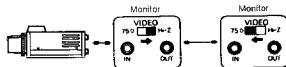


Recommended wire gauge sizes for 24V AC Input Terminal

Copper wire size (AWG)	#24 (0.22mm ²)	#22 (0.33mm ²)	#20 (0.52mm ²)	#18 (0.83mm ²)
Length of Cable [ft]	314	495	842	1403
[Approx.] [m]	95	150	255	425

Video Cable

1. It is recommended to use a video monitor whose resolution is at least equal to the camera's.
2. Terminate the camera output with 75-ohm resistor at the furthest end of its cable run.
 - A. Use 75-ohms coaxial cable.
 - B. Always set the last monitor's termination switch to 75 ohms, and set the termination switches of intermediate monitors to HIGH (HI-Z).



- C. The maximum extensible coaxial cable length between the camera and the monitor is shown in the table 1. Since cable quality varies among manufacturers, please verify video quality before final installation, if maximum lengths are to be used.

Table 1

Type of coaxial cable	RG-59/U (3C-2V)	RG-6/U (5C-2V)	RG-11/U (7C-2V)	RG-15/U (10C-2V)
Recommended Maximum cable length	(ft) 825 (m) 250	1,650 500	1,980 600	2,840 800

3. Wiring precautions:

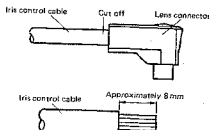
- o Do not bend coaxial cable into a curve whose radius is smaller than 10 times the cables diameter.
 - o Never staple the cable - not even with circular staples. Mismatching will occur.
 - o Never crush or pinch the cable.
- All of these will change the impedance of the cable and cause poor picture quality.

INSTALLATION OF AUTO IRIS LENS CONNECTOR

When you use an auto iris lens other than listed on page 4 item 5, for example a video servo ALC lens, install the lens connector (YFE4191J100) coming with the camera as follows.

The following installation should be made by qualified service personnel or system installers.

- (1) Cut off the iris control cable at the edge of lens connector and then cut off the outer cable cover as shown in the diagram.



- (2) Cut off the inner cable covers of the iris control cable as shown in the diagram.



- (3) Put the heat shrinkable tubes or equivalent tubes on the inner cables of the iris control cable.
- (4) Solder the inner cables of the iris control cable at the pin-plug block according to the following pin assignment and cover the heat shrinkable tubes or equivalent tubes over the soldered area and heat on the tubes to shrink them.

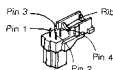
Pin 1: Power source; +9V DC, 50mA Max.

Pin 2: Not used

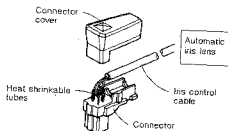
Pin 3: Video signal; 1.2Vp-p/40 kohms

Pin 4: Shield, ground

(Set the Lens Selection Switch (5) to the VIDEO position)



- (5) Both the connector cover and connector should be positioned to interlock.



Note:

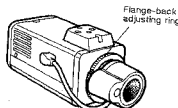
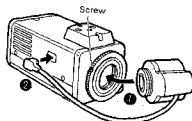
Cut off the rib on the connector, when the iris control cable is too thick and the connector cover and connector can not be interlocked.

MOUNTING THE LENS

Caution:

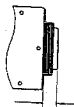
Always set the Flange-back adjusting ring to fully clockwise (C-mount side) by loosening one screw on the ring before mounting the lens, otherwise the inner glass and CCD image sensor could be damaged by the lens.

- (1) Mount the lens by turning it clockwise onto the lens mount of the camera.
- (2) Connect the lens cable to the Auto Iris Lens Connector on the camera when an auto iris lens is used. (Only auto iris lenses)
- (3) Set the Lens Selection Switch (5) to the proper position as follows.
 DC: The mounted lens is one of the lenses listed on page 4 item 5, or one that requires the DC control signal for auto iris control.
 VIDEO: The mounted lens requires video signal for auto iris control.



When you use the lens other than listed on page 4 item 5, lens mount should be C-mount or special C-mount (CS-mount (1"-32UN)) and lens weight should be less than 450g. If not, both the lens and camera should be secured.

The protrusion of the rear of the lens should be as shown below.

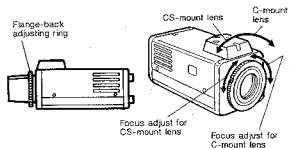


C-mount : Less than 11 mm
 CS-mount : Less than 8 mm

FOCUS OR FLANGE-BACK ADJUSTMENT

The following adjustment should be made by qualified service personnel or system installers.

1. Loosen one screw on the flange-back adjusting ring.



2. Turn the flange-back adjusting ring to the desired position.

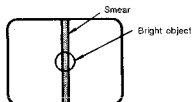
Caution:

Do not turn this ring too much to counterclockwise as this could damage the inner glass and CCD image sensor.

3. Tighten the screw on the flange-back adjusting ring.

PREVENTION OF BLOOMING AND SMEAR

When the camera is aimed toward spot lights or other bright lights and light reflecting objects, smear or blooming may appear. Therefore, the camera should be operated carefully in the vicinity of extremely bright objects to avoid smear or blooming.



INSTALLATION OF CAMERA

o Mounting from the top

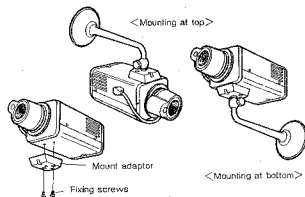
This camera is originally designed to be mounted from the top, as shown. The hole is the standard photographic pan-head screw size (1/4" - 20).

o Mounting from the bottom

Remove the mount adaptor from the top of the camera by removing two fixing screws.

Attach the mount adaptor to the bottom as shown in the diagram, then mount the camera on the mounting bracket.

Make sure that two original screws are used when mounting the mount adaptor; longer type screws may damage inner components.



CIRCUIT DESCRIPTION

1. Principle of Color CCD Camera

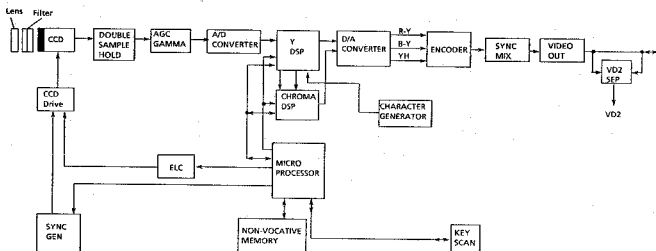


Fig. 1-1 Block Diagram of WV-CL320 Series

The incoming light passes through the lens, the infrared (IR) cut filter, and the crystal filter to reach the surface of the CCD (charge coupled device) image sensor. The CCD image sensor produces the output signal whose level corresponds to incoming light intensity. The output signal is converted into pre video signal by sample hold circuit. This signal is sent to A/D converter through auto gain control circuit and gamma correction circuit.

The signal is converted into 8 bit digital data by A/D converter and sent to Y digital signal processor (Y DSP).

The signal is routed in two different ways through the Y DSP and the Chroma digital signal processor (CHROMA DSP) respectively.

The 1H delay signal and (0H + 2H)/2 delay signals are fed from Y DSP to CHROMA DSP, and from CHROMA DSP, each block data (the image is split into 25 blocks) of the image for each field is supplied sequentially to the microprocessor. When Electric Light Control (ELC) mode is selected, equally add data of 25 blocks with the microprocessor to calculate a difference between the current level and the target brightness level for output of shutter speed and fine adjusting AGC control voltage to the ELC gate array, AGC and Gamma.

The ELC signal generator converts the shutter speed data received from microprocessor into pulses and output to the V. driver. The V. driver converts the shutter pulse into voltage necessary for control of ELC mode and send to CCD.

The output signal of Y DSP flows through the D/A converter which converted into luminance signal to the encoder circuit to be mixed with color signal and sync signal, and output from the camera.

The output signal of CHROMA DSP flows through the D/A converter which converted into R-Y and B-Y signal to the encoder circuit to be mixed with luminance signal, yielding the composite NTSC output signal.

The gen-lock control circuit receive external sync signal and generates clock pulse which supplied to sync generator circuit for synchronizing the horizontal (H) and vertical (V) sync signal.

The sync generator generates necessary pulses for producing the composite color video signal, and send them to the Drive pulse generator circuit and Digital Board.

The Drive pulse generator generates H. and V. transfer pulse which are synchronized with the H. and V. drive pulses and sends them to the CCD image sensor.

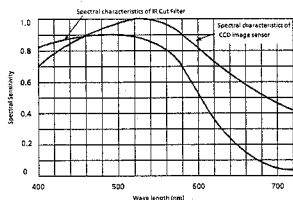


Fig. 1-2 IR Cut Filter Response

• Crystal Filter

The yellow, cyan, green and magenta images are modulated by the fine mosaic filter built into the CCD image sensor, a false signal could develop due to interference between the fine mosaic filters and fine detail objects. The crystal filter is an optical low pass filter which prevents the occurrence of such false signals by blocking the high frequency components of images.

• CCD image Sensor

CCD image sensor is made up of a simple MOS structure and consists of:

- (1) Photodiode (PD) ... Generates charge packets corresponding to the incoming light intensity.
- (2) V-CCD ... Accumulates the charge packets from PD and transfers them in the vertical direction.
- (3) H-CCD ... Transfers charge packets in the horizontal direction to the output.
- (4) Output Section ... Outputs the signal transferred from the H-CCD sequentially.

The block diagram of the CCD image sensor is shown below. Each pixel corresponds to one photo diode.

• Interline Transfer System

Accumulated charge packets on the independent sensor (Photo Diode) are transferred to the vertical shift register (V-CCD) all at once in every vertical blanking period (1/50 sec). They are then shifted one-step down to the horizontal shift register (H-CCD) in every horizontal blanking period. The charge packets in H-CCD are transferred to the left by turns, and taken out as the outputs signal.

Transferring the charge packets down in the V-CCD corresponds to vertical scanning and transferring the signal charges from the V-CCD to the left, in H-CCD corresponds to horizontal scanning.

In the next section, the transfer is described in sequence.

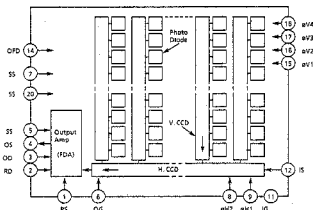


Fig. 1-3 Block Diagram of CCD image Sensor

Let's study it by referring to the timing of the composite video output (VBS) signal.

- ① At first, all accumulated charge packets in all photo diodes are read out into the V-CCD ((1), (2)).
- ② The charge packets in the V-CCD are transferred one-step down. By this action, the charge packets of one horizontal line are transferred to the H-CCD ((4)).
- ③ The charge packets in the H-CCD are transferred to the left in order and the video signal for that line is output during the horizontal scanning period (horizontal picture period) ((3)).

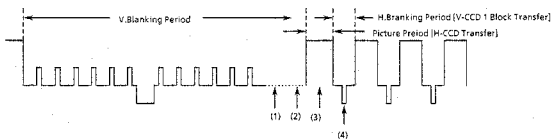


Fig. 1-4 Timing Chart of Transfer

- ④ After completing the transfer from right to left, the next row of charge packets in the V-CCD are transferred into the H-CCD in the next horizontal blanking period.
- ⑤ By repeating ②~④, charge packets for 1V period (312.5 lines) have been transferred (No. 1 field has been completed.).

After that, the steps beginning at ① are repeated for the No. 2 field scanning.

As result, the readout of the charge packets from the PDs is done every 1V period (1/50 sec.). A by-product of this system is a flicker effect when fast moving objects are scanned.

The sensor incorporates an integrated color filter, much the same as a tube-type camera.

The CCD image sensor contains an array of photo-diodes (PD), each under it's own colored filter. As shown below, the photo-diodes are connected to vertical shift registers (V-CCD), which are connected to a horizontal shift register (H-CCD). The output is taken from the Floating Diffusion Amplifier (FDA).

Figure 1-5 indicates the signal charge readout system. This system is called the "field integration" mode, whereby the outputs of a pair of PDs are mixed to produce a single charge packet.

First, each PD charges to a level which is dependent on the level of incident illumination. These charges are then shifted to the V-CCD by vertical transfer pulses 1 and 3 (ØV1 & ØV3). Next, pairs of charges are mixed to produce charge packets. Different pairs of charges are mixed for fields A and B.

- Charge storage in the photo-diodes
- Charge transfer from PDs to V-CCD
- Mixing of charges in V-CCD for field A
- Mixing of charges in V-CCD for field B

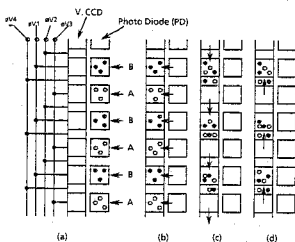


Fig. 1-5 Readout Organization of Signal Charge

Figure 1-6 shows the layout of the color filter. The mixing scheme is shown for both fields as well. For example, to produce line 1 of field A, rows 1 & 2 are mixed. Line 2 is produced by mixing rows 3 & 4, and so on. To produce the first line of field B however, rows 2 & 3 are mixed, followed by 4 & 5 for the next line, and so on.

The output signals from the CCD image sensor are as follows

Complete signal, line N

$$S_N = Y_N + C_N \sin(\omega_c t)$$

Complete signal, line $N+1$

$$S_{N+1} = Y_{N+1} + C_{N+1} \sin(\omega_c t)$$

Luminance component, line N

$$Y_N = (Ye + G) + (Cy + Mg) = 2R + 3G + 2B$$

Luminance component, line $N+1$

$$Y_{N+1} = (Ye + G) + (Cy + Mg) = 2R + 3G + 2B$$

Chrominance component, line N

$$C_N = (Cy + Mg) - (Ye + G) = 2B - G$$

Chrominance component, line $N+1$

$$C_{N+1} = (Cy + Mg) - (Ye + G) = 2R - G$$

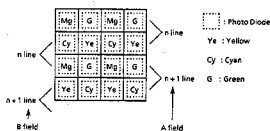


Fig. 1-6 Color Filter Geometry

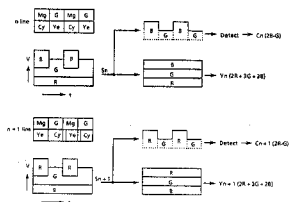


Fig. 1-7 Color Signal Separation (Field "A")

2.Sensor Board

This board receives the pulses from Drive board and sends these pulses to CCD image sensor IC1 in order to take out the CCD output signal.

The CCD output signal obtained at pin 4 of IC1 is fed through buffer Q2 to the board to convert it into the video signal.

• CCD Image Sensor

The CCD image sensor used in camera is interline transfer CCD sensor.

The CCD image sensor has 355,544 picture elements (horizontal 682 x vertical 492).

Its image size is 6.4 mm (H) x 4.8 mm (V) so that 1/2-inch optics and lens can be used.

The CCD image sensor is mounted on dual in line package with 20 pins and has an optical window in front of the cell as shown in Fig. 2-1

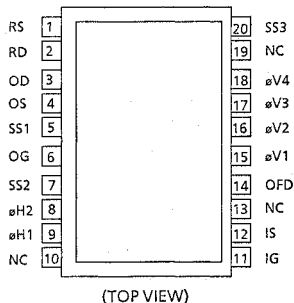


Fig. 2-1 Appearance of CCD Image Sensor

Items	Value	Unit
Cell Size	9.6 (V) x 9.9 (H)	μm
Image Size	4.8 (V) x 6.4 (H)	mm ²
Number of Elements	492 (V) x 682 (H)	PCS

Table 1 Specification of CCD Image Sensor

The pin identification of CCD image sensor is as follows.

Pin No	Name	Description
1	RS	Reset Gate
2	RD	Reset Drain
3	OD	Drain of Output Transistor
4	OS	Source of Output Transistor
5	OS	Ground
6	OG	Output Gate
7	SS2	Ground
8	ØH2	H Transfer Pulse 2
9	ØH1	H Transfer Pulse 1
10	NC	Not Used
11	IG	Input Gate
12	IS	Input Source
13	NC	Not Used
14	OFD	Over Flow Drain
15	ØV1	V Transfer pulse 1
16	ØV2	V Transfer pulse 2
17	ØV3	V Transfer pulse 3
18	ØV4	V Transfer pulse 4
19	NC	Not Used
20	SS3	Ground

3. Drive Board

3-1 Sample Hold Circuit

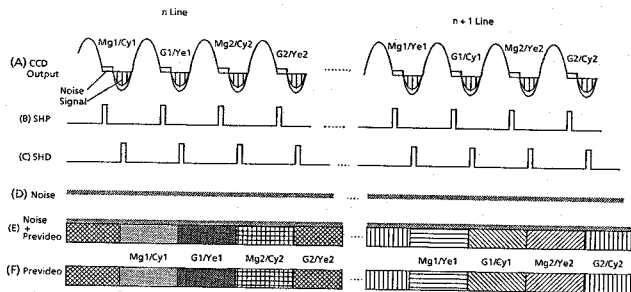


Fig.3-1 Waveform of Sample Hold

This circuit receives the modulated CCD output signal from CCD image sensor on the sensor board and eliminates noise component and produces prevideo signal.

The CCD output signal (A) from Sensor board is supplied to both sample hold circuits inside IC2.

The noise component is gated by both SHP (B) and SHD (C) supplied through pins 6 and 7.

The signal + noise component (E) are gated from the CCD output signal (A) by SHD (C) supplied through pin 7.

The gated noise (D) and signal + noise (E) are then supplied to differential amplifier, where noise component is eliminated and signal is inverted. In this way the prevideo signal is obtained at pin 8 of IC2 and supplied to other circuits.

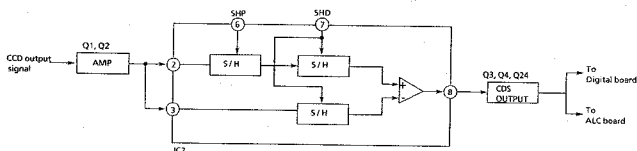


Fig.3-2 Block diagram of YWCXA1439M

3-2 CCD Drive Pulse Generator

This circuit receives vertical drive (VD) pulse and wide horizontal drive (WHD) pulse from Sync/Encoder board and clock pulse from drive pulse generator IC6 and generates CCD drive pulses and other pulses.

The VCO circuit consists of D7, D8, C10, C12, C13, L12 (VCO) with oscillator inside IC6 generates 25 MHz signal.

In IC3 phase of the clock pulse routed to pin 6 with WHD pulse to pin 8 are compared. This compared pulse obtained at pin 11 of IC3 is supplied through L.P.F Q6, R26, R29, C7 and C46 that convert into VCO control bias to VCO circuit forming PLL circuit to stabilize the oscillation frequency.

The pin identification of CCD drive pulse generator IC6 (YVMB621488U) is as follows.

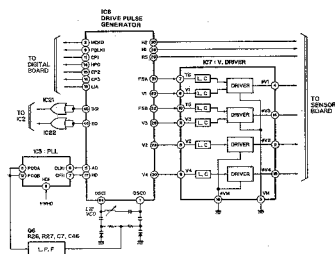


Fig.3-3 Drive Pulse Generator Circuit

Pin No	Pin Name	IN/Out	Description
1	OSCO	Out	OSC out
2	MCKO	Out	Clock pulse
3	TEST1	In	Not Used
4	FCKEN	In	2fck Output Cont (H : Output L : Stop)
5	FCK2	Out	1f Clock Pulse
6	STM1	In	Shutter Speed Mood 1
7	STM2	In	Not Used
8	STM3	In	Shutter Speed Mood 3
9	PBLK1	Out	Preblanking
10	PBLK2	Out	Not Used
11	CP1	Out	Clamp Pulse 1
12	BI	In	Ground
13	BO	Out	Not Used
14	HPO	Out	ØH Clear Pulse
15	CP2	Out	Clamp Pulse 2

16	CP3	Out	Clamp Pulse 3
17	HD	In	H. Drive Pulse
18	VD	In	V. Drive Pulse
19	LIA	Out	1/2FH
20	LIB	Out	Not Used
21	CI	In	Not Used
22	CO	Out	Not Used
23	V1	Out	V. Transfer Pulse 1 (ØV1)
24	GND	-	Ground
25	VDD	In	+ 5V DC Power
26	D1	In	Not Used
27	DO	Out	Not Used
28	V2	Out	V. Transfer Pulse 2 (ØV2)
29	V3	Out	V. Transfer Pulse 3 (ØV3)
30	V4	Out	V. Transfer Pulse 4 (ØV4)
31	FSA	Out	Field Shift Pulse (ØV1)
32	FSB	Out	Field Shift Pulse (ØV3)
33	FES	Out	Not Used
34	VDD	In	+ 5V DC Power
35	H2	Out	H. Transfer Pulse 2 (ØH2)
36	H1	Out	H. Transfer Pulse 1 (ØH1)
37	EXST	In	External Shutter Trigger
38	EXEN	In	External Shutter Mode
39	FRS	Out	Reset Pulse (ØR)
40	GND	-	Ground
41	RW1	In	Reset Pulse Width
42	RW0	Out	Reset Pulse Width
43	EI	In	Not Used
44	EO	Out	Not Used
45	DS1	Out	Sample Hold Pulse 1
46	DS2	Out	Sample Hold Pulse 2
47	INT	-	Ground
48	ADSEN	In	ADS Enable
49	SPO	Out	Not Used
50	SPI	-	Ground
51	TEST2	In	Not Used
52	ASEL1	In	ADS Phase 1
53	ADEL2	In	ADS Phase 2
54	ASD	Out	Not Used
55	TVM	In	NTSC/PAL (H : PAL L : NTSC)
56	VDD	In	+ 5V DC Power
57	GND	-	Ground
58	DLS1	-	Ground
59	DLS2	In	Not Used
60	INPM	Out	Shutter Mode
61	SP1	Out	Not Used
62	SP2	In	Not Used
63	SDC	In	Serial Data Cont
64	OSC1	In	OSC In

The H. transfer pulse 1, 2 (H1, 2) obtained at pins 36 and 35 of IC6 are supplied to Sensor board.

The reset pulse (R) obtained at pin 39 of IC6 is supplied to Sensor board.

The V. transfer timing pulses 1 (V1), 2 (V2), 3 (V3) and 4 (V4) are generated in IC6 and obtained at pins 23, 28, 29 and 30 of IC6.

These pulses are supplied to V.Driver IC7 where their levels are converted to specified DC level according to the fixed timing for producing V. Transfer pulses (ØV1 - ØV4).

The field shift pulses from pins 31 and 32 of IC6 are supplied to pins 7 and 10 of IC7 and mixed with V1 and V3 pulses.

3-3 ALC Circuit

When the Lens Selection switch SW1 on the ALC board is set to DC position, lens iris control DC bias is sent to ALC Lens through ALC board.

The damper signal induced by damper coil in auto iris lens is fed back through IC10 (a) to IC10 (b) for preventing hunting.

When the Lens Selection Switch SW1 on the ALC board is set to VIDEO position, CDS output signal from CDS output circuit Q3, Q4 and Q24 on the Drive board is sent to lens through ALC board.

3-4 Reset/Power off Control Circuit

This circuit generates the reset control signal and power off control DC signal.

+4.5V DC obtained at pin 1 of IC8 after 2µ sec when power on the camera is fed to pin 16 of Microprocessor IC10 and pin 41 of ELC signal generator IC13 on the Digital board.

When power off the camera, power off control obtained at pin 1 of IC9 is fed to pin 23 of Microprocessor IC10 on the Digital board.

3-5. VD2 Separation Circuit

When the multiplexed vertical drive pulse (VD2) is supplied to the Video Output Connector on the rear of camera from the Multiplex Unit WJ-MP404, signal is appear at pin 13 of CN6.

The VD2 is supplied to VD2 separator consisting of Q18 ~ Q21 where only VD2 is extracted.

The only VD2 obtained at collector of Q18 is fed to pin 63 of Sync generator IC7 on the Sync/Encoder board.

4. Sync/Encoder Board

4-1 Sync Generator Circuit

This circuit generates the pulses necessary to produce the video signal. The sync generator IC7 has detect circuits of Sync signal Multiplexed Vertical Drive (VD2), Line-lock (LL) and Internal Sync (INT) and output of phase comparator inside IC7 is selected by analog switch inside IC7 that apply to input signal. The priority of sync mode is as follows.

Sync mode	
1	VD2
2	LL
3	INT

The 14 MHz oscillator is composed of X1, D2, D3, R9-R12, C4 and C5, it's oscillation frequency controlled by oscillator control DC obtained at pin 1 of IC7 is fed to 14 MHz oscillator. The oscillation output is supplied to pin 72 of IC7 for producing 3.58 MHz subcarrier signal. The subcarrier signals (SC B) and (SC R) obtained at pins 74 and 75 of IC7 are fed to pin 39 (SC B) and pin 40 (SC R) of Modulator/Encoder IC4. The sync mode obtained at pin 38, pin 39 and pin 40 of IC7 is fed to Key Scan circuit of Digital board.

	Pin 38	Pin 39	Pin 40
Sync mode	M1	M2	M3
VD2	H	H	L
LL	H	L	H
INT	L	L	L

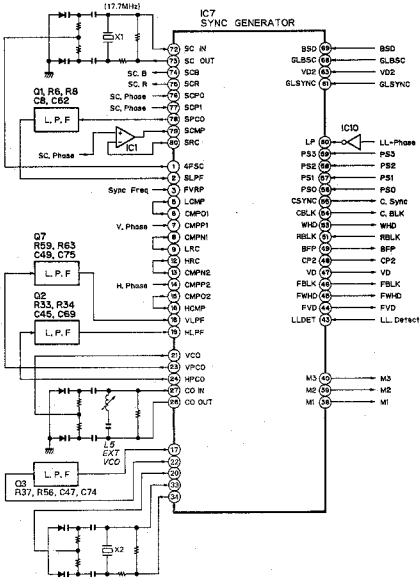


Fig.4-1 Sync Generator Circuit

The pin identification of sync generator IC7 (MN73069LBM2) is as follows.

Pin No	Pin Name	IN/OUT	Description
1	4FSC	Out	OSC Cont DC
2	SLPF	In	Phase detect
3	FVRP	In	Frequency cont
4	FVR	-	Not used
5	LCMP	In	Clear
6	CMPO1	Out	V. Phase
7	CMPP1	In	V. Phase
8	CMPP1	In	V. Phase cont
9	LRC	Out	V. Phase cont
10	VDD2	In	DC Power
11	GND2	-	Ground
12	HRC	Out	H. Phase cont
13	CMPP2	In	H. Phase cont
14	CMPP2	In	H. Phase
15	CMPO2	Out	H. Phase
16	HCMP	In	Clear
17	DLPF	In	V. Lock
18	VLPF	In	V. LOCK
19	HLPF	In	H. LOCK
20	VCKO	Out	OSC Cont
21	VCO	Out	LC OSC Cont
22	DPCO	-	Not Used
23	VPCO	Out	V. Phase Comparator output
24	HPCO	Out	H. Phase Comparator output
25	MVPC	In	V. Reset Mask pulse ON/OFF (H : ON L : OFF)
26	VC1	Out	VCO Cont
27	COIN	In	External VCO
28	COOUT	Out	External VCO
29	CLKO	Out	Clock Pulse
30	GND3	-	Ground
31	VDD3	In	DC Power
32	VC2	Out	Not Used
33	CKIN	In	External VCO
34	CKOUT	Out	External VCO
35	TESTA	-	Not Used
36	TESTB	-	Not Used
37	TESTC	-	Not Used
38	M1	Out	Gen-Lock Mode Detect-1
39	M2	Out	Gen-Lock Mode Detect-2
40	M3	Out	Gen-Lock Mode Detect-3
41	CW	In	Color/B/W Select (H : B/W, L : Color)
42	VDCF	In	Field/Frame Select (H : Field L : Frame)
43	LLDET	In	LL Select (H : ON L : OFF)
44	FVD	Out	Vertical Drive Pulse
45	FWHD	Out	Wide Horizontal Drive Pulse
46	FBLK	Out	Blanking Pulse
47	VD	Out	Vertical Drive Pulse
48	CP2	Out	Clamp Pulse-2
49	BFP	Out	Burst Flag Pulse
50	GND4	-	Ground
51	RBLK	In	Return Blanking Pulse
52	PWHD	In	Wide Horizontal Drive Pulse
53	WHD	Out	Wide Horizontal Drive Pulse
54	CBLK	Out	Composite Blanking Pulse
55	CSYNC	Out	Composite Sync
56	PSO	In	Line-Lock coarse ADJ
57	PSI	In	Line-Lock coarse ADJ
58	PS2	In	Line-Lock coarse ADJ
59	PS3	In	Line-Lock coarse ADJ
60	LP	In	Line-Lock Pulse
61	GLSYNC	In	Gen-Lock Sync
62	GLVD	In	Gen-Lock VD
63	VD2	In	Gen-Lock VD
64	NP	In	NTSC/PAL Select (H : PAL L : NTSC)
65	MCONT	In	Gen-Lock Mode Detect Cont
66	MS	In	OSC Frequency Select (H : NTSC 910fh PAL 908fh) (L : NTSC 1820fh PAL 1816fh)
67	CLR	In	Clear
68	GLBSC	In	Gen-Lock Burst Subcarrier
69	BSD	In	Burst Subcarrier Detect
70	VDD1	In	DC Power
71	GND1	-	Ground
72	SCIN	In	4fsc (NTSC : 14.3 MHz PAL : 17.7 MHz)
73	SCOUT	Out	4fsc (NTSC : 14.3 MHz PAL : 17.7 MHz)
74	SCR	Out	Subcarrier R
75	SCB	Out	Subcarrier B
76	SCPO	In	Burst lock Phase coarse ADJ
77	SCPI	In	Burst lock Phase coarse ADJ
78	SCPO	Out	SC Phase
79	SCMP	In	SC Phase clear
80	SRC	Out	SC Phase cont

4-3 D/A Converter Circuit

This D/A Converter IC5 receives the 12 bit serial data from Digital board and analogue signal obtained at pin 4 ~ pin 9, pin 12, pin 13, pin 18 and pin 19 of IC5 is fed to other circuits.

The pin identification of D/A converter IC5 (YWM62352FP) is as follows:

Pin No	Pin Name	IN/Out	Description
1	VSS	-	Ground
2	A03	Out	Carrier Add
3	A04	Out	SC ADI
4	A05	Out	R white balance control
5	A06	Out	R white balance control
6	A07	Out	Low clip
7	A08	Out	SC Phase
8	A09	Out	H Phase
9	A10	Out	V Phase
10	VDD	In	+5V DC
11	VCC	In	+5V DC
12	A12	Out	Chroma phase
13	A11	-	Not Used
14	D0	-	Not Used
15	LD	In	D/A CS
16	CLK	In	Serial clock
17	DI	In	Serial data
18	A01	Out	Burst level
19	A02	Out	+5V Cont
20	GND	-	Ground

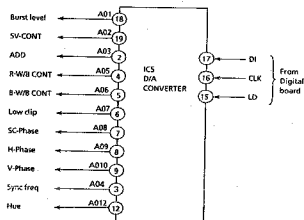


Fig. 4-3 D/A Converter circuit

4-4 External Sync Signal Circuit

When external sync signal such as VBS or VS signal is supplied to Gen-lock Input Connector on the power board, signal obtained at pin 7 of CN3 is fed to inverter/amplifier Q37, and it is sent to inverter Q38.

The gen-lock sync signal obtained at pin 6 (collector) of Q38 whose chrominance component is eliminated by R55 and C16 is fed to pin 61 of sync generator IC7.

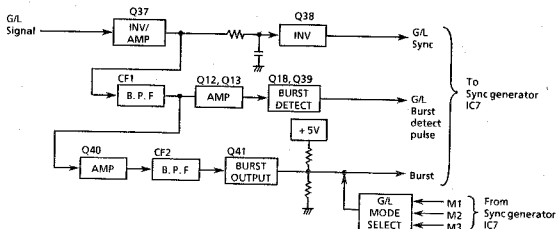


Fig. 4-4 External Sync Signal circuit

The pin identification of Y.DSP IC8 (MN6730FHP) is as follows.

Pin No	Pin Name	IN/Out	Description
1	DL28	Out	(0H + 2H)/2 delayed signal data
2	DL27	Out	(0H + 2H)/2 delayed signal data
3	DL26	Out	(0H + 2H)/2 delayed signal data
4	DL25	Out	(0H + 2H)/2 delayed signal data
5	DL24	Out	(0H + 2H)/2 delayed signal data
6	DL23	Out	(0H + 2H)/2 delayed signal data
7	DL22	Out	(0H + 2H)/2 delayed signal data
8	DL21	Out	(0H + 2H)/2 delayed signal data
9	DL20	Out	(0H + 2H)/2 delayed signal data
10	DL17	Out	1H delayed signal data
11	DL16	Out	1H delayed signal data
12	DL15	Out	1H delayed signal data
13	DL14	Out	1H delayed signal data
14	DL13	Out	1H delayed signal data
15	DL12	Out	1H delayed signal data
16	DL11	Out	1H delayed signal data
17	DL10	Out	1H delayed signal data
18	TEST2	-	Ground
19	TEST1	-	Ground
20	CLK	In	clock pulse
21	VSS1	-	Ground
22	VDD1	In	+4.5V DC
23	Y08	Out	Y data
24	Y07	Out	Y data
25	Y06	Out	Y data
26	Y05	Out	Y data
27	Y04	Out	Y data
28	Y03	Out	Y data
29	Y02	Out	Y data
30	Y01	Out	Y data
31	Y00	-	NOT USED
32	HCLR	In	H Clear Pulse
33	HD	In	Wide Horizontal Drive pulse
34	VCTL	-	Not Used
35	BIN	-	Not Used
36	GIN	-	Not Used
37	RIN	-	Not Used
38	BCTL	In	Back Character
39	FMEM	In	Character
40	NC	-	Not Used
41	NPB	-	Not Used
42	ADR4	In	Address 4
43	ADR4	In	Address 3
44	ADR4	In	Address 2
45	ADR4	In	Address 1
46	ADR4	In	Address 0
47	DB7	In	Data 7
48	DB6	In	Data 6
49	DB5	In	Data 5
50	DB4	In	Data 4
51	DB3	In	Data 3
52	DB2	In	Data 2
53	DB1	In	Data 1
54	DB0	In	Data 0
55	CS3	In	Chip Select 3
56	CS2	In	Chip Select 2
57	CS1	In	Chip Select 1
58	NWE	In	Write Enable
59	BLK	In	Wide Horizontal Drive pulse
60	NC	-	Not Used
61	BLKZ	-	Not Used
62	BLKA	-	Not Used
63	CGD 5	Out	Chroma gain control
64	CGD 4	Out	Chroma gain control
65	CGD3	Out	Chroma gain control
66	CGD2	Out	Chroma gain control
67	CGD1	Out	Chroma gain control
68	CGD0	Out	Chroma gain control
69	VDD2	In	+4.5V DC
70	VSS2	-	Ground
71	DLS	-	Not Used
72	DIN7	In	Data 7
73	DIN6	In	Data 6
74	DIN5	In	Data 5
75	DIN4	In	Data 4
76	DIN3	In	Data 3
77	DIN2	In	Data 2
77	DIN1	In	Data 1
79	DIN0	In	Data 0
80	NC	-	Not Used

5-3 Chroma Digital Signal Processor (C.DSP) Circuit

The circuit generates the R-Y and B-Y color difference signals data.

The R-Y and B-Y color difference signal data obtained at pin 73 ~ 80 of C.DSP IC9 is fed through D/A converter when the R-Y and B-Y color difference signal data is converted into analog signals to Chroma Encoding circuit of Sync/Encoder board.

The pin identification of C.DSP IC9 (MN6731FHP) is as follows.

Pin No	Pin Name	IN/Out	Description
1	CLK	In	Clock pulse
2	TEST1	-	Ground
3	TEST2	-	Ground
4	DL10	In	1H delayed signal data
5	DL11	In	1H delayed signal data
6	DL12	In	1H delayed signal data
7	DL13	In	1H delayed signal data
8	DL14	In	1H delayed signal data
9	DL15	In	1H delayed signal data
10	DL16	In	1H delayed signal data
11	DL17	In	1H delayed signal data
12	DL20	In	(0H + 2H)/2 delayed signal data
13	DL21	In	(0H + 2H)/2 delayed signal data
14	DL22	In	(0H + 2H)/2 delayed signal data
15	DL23	In	(0H + 2H)/2 delayed signal data
16	DL24	In	(0H + 2H)/2 delayed signal data
17	DL25	In	(0H + 2H)/2 delayed signal data
18	DL26	In	(0H + 2H)/2 delayed signal data
19	DL27	In	(0H + 2H)/2 delayed signal data
20	DL28	In	(0H + 2H)/2 delayed signal data
21	VD	In	Vertical Drive pulse
22	HD	In	Wide Horizontal Drive pulse
23	CSPC	In	Line Select
24	BEND	Out	Boarder End
25	BF	In	Blanking pulse
26	BFA	In	Return Blanking pulse
27	SYNC	-	Ground
28	SYNC A	-	Not Used
29	VDD1	In	+4.5V DC
30	VSS1	-	Ground
31	CP2	-	Ground
32	CP2A	-	Not Used
33	CGD0	In	Chroma gain control data 0
34	CGD1	In	Chroma gain control data 1
35	CGD2	In	Chroma gain control data 2
36	CGD3	In	Chroma gain control data 3
37	CGD4	In	Chroma gain control data 4
38	CGD5	In	Chroma gain control data 5
39	HCLR	In	H Clear pulse
40	HCLK	Out	R-Y/B-Y Select
41	DSEL1	-	Ground
42	NWE	In	Write enable
43	NRE	In	Read enable
44	CS1	In	Chip Select 1
45	CS2	In	Chip Select 2
46	CS3	In	Chip Select 3
47	DB0	In/Out	Data 0
48	DB1	In/Out	Data 1
49	DB2	In/Out	Data 2
50	DB3	In/Out	Data 3
51	DB4	In/Out	Data 4
52	DB5	In/Out	Data 5
53	DB6	In/Out	Data 6
54	DB7	In/Out	Data 7
55	ADR0	In	Address 0
56	ADR1	In	Address 1
57	ADR2	In	Address 2
58	ADR3	In	Address 3
59	ADR4	In	Address 4
60	ADR5	In	Address 5
61	DCP	In	Digital clamp pulse
62	BIN	-	Ground
63	GIN	-	Ground
64	RIN	-	Ground
65	BCTL	In	Not Used
66	FMEM	In	Not Used
67	NPB	In	Negative/Positive select
68	BLK	In	Wide Horizontal Drive pulse
69	PWM	-	Not Used
70	VSS2	-	Ground
71	VDD2	In	+4.5V DC
72	FLD	Out	Field Select
73	CO1	Out	Color difference signal data 1
74	CO2	Out	Color difference signal data 2
75	CO3	Out	Color difference signal data 3
76	CO4	Out	Color difference signal data 4
77	CO5	Out	Color difference signal data 5
78	CO6	Out	Color difference signal data 6
79	CO7	Out	Color difference signal data 7
80	CO8	Out	Color difference signal data 8

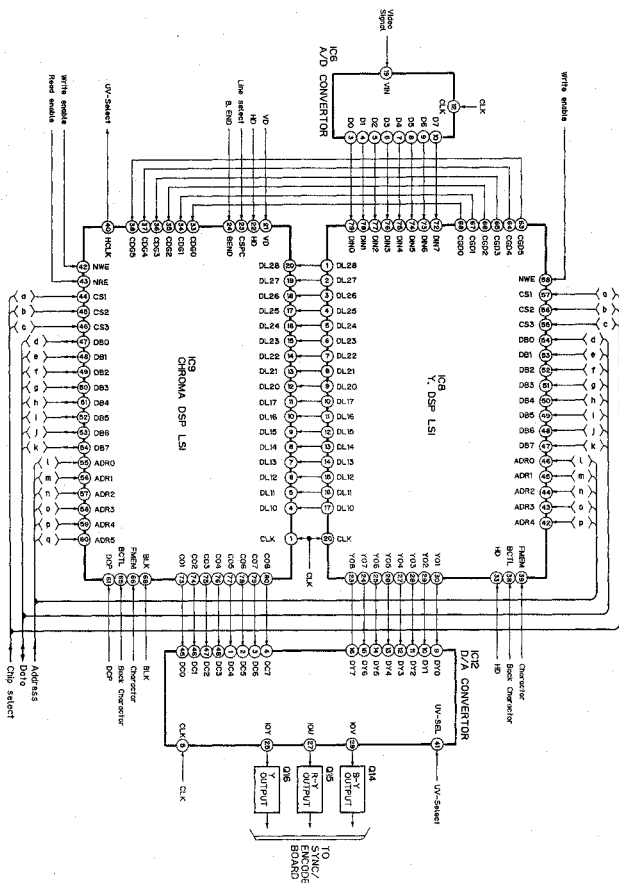


Fig. 5-2 Y DSP / C DSP circuit

5-4 Microprocessor Circuit

This circuit generates the control (command) data and sent to Y.DSP, C.DSP and ELC signal generator.

The pin identification of microprocessor IC10 (MN188166CCV2) is as follows.

Pin No	Pin Name	IN/Out	Description
1	ADR13	Out	Chip Select
2	ADR12	-	Not Used
3	ADR11	-	Not Used
4	ADR10	-	Not Used
5	ADR9	-	Not Used
6	ADR8	-	Not Used
7	ADR7	Out	Address 7
8	ADR6	Out	Address 6
9	ADR5	Out	Address 5
10	ADR4	Out	Address 4
11	ADR3	Out	Address 3
12	ADR2	Out	Address 2
13	ADR1	Out	Address 1
14	ADR0	Out	Address 0
15	EX1	-	Ground
16	RST	In	Reset
17	RE	Out	Read enable
18	WE	Out	Write enable
19	RW	-	Not Used
20	S3	-	Not Used
21	S2	-	Not Used
22	S1	-	Not Used
23	IRQ2	In	Power off
24	IRQ1	In	Boarder End
25	IRQ0	In	Vertical Drive pulse
26	P22	In	B detect signal data
27	P21	In	Field Select
28	P22	In	Key scan
29	OSC2	Out	8 MHz OSC
30	OSC1	In	8 MHz OSC
31	VSS	-	Ground
32	X1	-	Ground
33	P17	Out	ALC/ELC Select (ELC: H ALC: L)
34	P16	Out	LL Detect (LL: H)
35	P15	Out	SC Phase coarse
36	P14	Out	SC Phase coarse
37	P13	Out	V.Phase coarse
38	P12	Out	V.Phase coarse
39	P11	Out	V.Phase coarse
40	P10	Out	V.Phase coarse
41	P32	Out	Chip Select
42	P31	Out	D/A Chip Select
43	P30	Out	Chip Select
44	SBT0	In/Out	Serial Clock
45	SB10	In	Serial Data
46	SB00	Out	Serial Data
47	NC	-	Not Used
48	SBT1	In/Out	Serial Clock
49	SB11	In	Serial Data
50	SB01	Out	Serial Data
51	P94	In	Test
52	P93	In	Bury
53	P92	Out	ALC Speed
54	P91	Out	Reset
55	P90	In	R detect signal data
56	AVSS	-	Ground
57	SH	-	Not Used
58	VREF	-	Ground
59	DA3	Out	AGC Cont
60	DA2	Out	ALC FINE CONT
61	DA1	Out	ALC CONT
62	DA0	Out	OB cont
63	AD3	-	Not Used
64	AD2	-	Not Used
65	AD1	-	Not Used
66	AD0	-	Not Used
67	VREF +	In	+3.5V DC
68	VDD	In	+4.5V DC
69	VDD	In	+4.5V DC
70	DATA7	In/Out	Serial data 7
71	DATA6	In/Out	Serial data 6
72	DATA5	In/Out	Serial data 5
73	DATA4	In/Out	Serial data 4
74	DATA3	In/Out	Serial data 3
75	DATA2	In/Out	Serial data 2
76	DATA1	In/Out	Serial data 1
77	DATA0	In/Out	Serial data 0
78	VSS	-	Ground
79	ADR15	Out	Chip Select
80	ADR14	Out	Chip Select

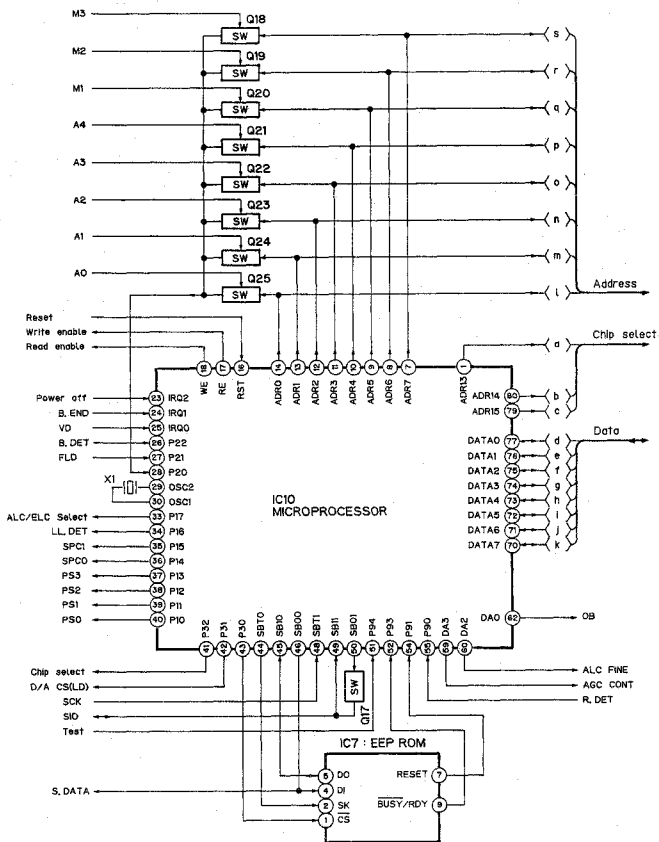


Fig. 5-3 Microprocessor circuit

5-5 ELC signal Generator Circuit

This circuit generates the electric light control signal and send them out to the microprocessor IC10.

When ELC mode is selected, the each block data (the image is split into 25 blocks) of the image for each field is supplied sequentially to the microprocessor.

In the microprocessor, the block datas are averaged and compared with the target adjustment level. The result of comparison is fed to pins 26 ~33 of ELC signal generator IC13 to generates Shutter speed control and AG voltage.

The ELC pulse obtained at pin 35 of IC13 is fed to Drive board.

The pin identification of ELC signal generator IC13 (MNS3020LB01) is as follows.

Pin No. Pin Name IN/Out Description

1	CLK	In	Clock pulse
2	INV2	In	LL Select
3	XCH	In	Field read out pulse
4	INV1	In	LL Select
5	DCSPC	Out	Line Select
6	CSPC	In	1/2FH
7	XVDA	Out	Vertical Drive pulse
8	XHDA	Out	Clamp pulse 2
9	HDA	In	Clamp pulse 2
10	VDA	In	Vertical Drive pulse
11	XWE	In	Write enable
12	TEST	-	Ground
13	WDOUT	Out	Black character
14	DOUT	Out	Character

15	WCHRIN	In	Back character
16	CHRIN	In	Character
17	VDD	In	+4.5V DC
18	VSS	-	Ground
19	ADDR0	In	Address 0
20	ADDR1	In	Address 1
21	ADDR2	In	Address 2
22	ADDR3	In	Address 3
23	XCS1	In	Chip select 1
24	CS2	In	Chip select 2
25	CS3	In	Chip select 3
26	D0	In	Data 0
27	D1	In	Data 1
28	D2	In	Data 2
29	D3	In	Data 3
30	D4	In	Data 4
31	D5	In	Data 5
32	D6	In	Data 6
33	D7	In	Data 7
34	XSUB	-	Not Used
35	XXSUB	Out	ELC pulse
36	HD	In	Wide horizontal drive pulse
37	VD	In	Vertical drive pulse
38	INV01	Out	LL select
39	VSS	-	Ground
40	VDD	In	+4.5V DC
41	XCLR	In	Reset
42	INV03	Out	NTSC/PAL select (NTSC: H PAL: L)
43	INV3	In	NTSC/PAL select (NTSC: H PAL: L)
44	INV02	Out	LL select

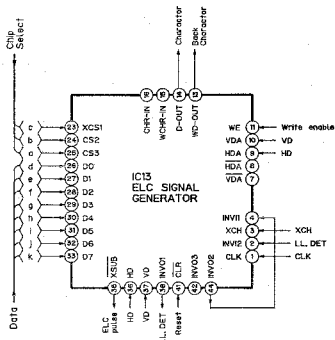


Fig.5-4 ELC signal Generator

When the image of ㉔ in the signal is shown on the screen.

- Data of ㉔ has been stored in DSP when data of ㉔ is fed to DSP.
- Microprocessor at that time calculates the level difference against target level based on data of ㉔.
- The ELC at that time outputs shutter pulse to the image of ㉔ by the shutter data supplied from Microprocessor to control the shutter speed by the shutter data.
- AGC IC outputs gain control voltage to the image of ㉔ to control its gain by the block data of ㉔ supplied from Microprocessor.

As a result, the shutter data calculated by Microprocessor is reflected to image of ㉔ (3V later), and the AGC control voltage is reflected to image of ㉔ (2V later).

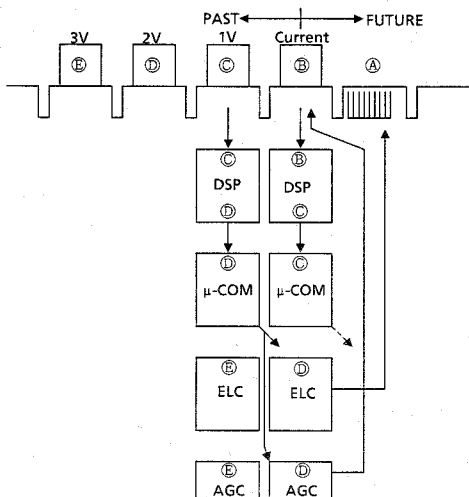


Fig. 5-5 Signal Processing with Microprocessor

About Your Computer

In order to run the E.V.R (Electric Variable Resistor) adjustment program your IBM-PC (PS2 or AT type) or compatible must meet the following requirements :

- The DOS Operating System must be 3.3 or higher.
- The Operating System must be 100% compatible with your computer.
- The memory in your IBM-PC must be at least 640K-bytes, and 512K-bytes shall be available to the E.V.R adjustment program.

Installing E.V.R Adjustment Program

- The Example given here is for A 2 drive computer, your procedure might vary slightly depending on drive configuration.
- Formatting new disk and making a copy of DOS Operating System
 - a) Insert disk containing DOS operating system into your floppy drive (for example, drive A) and type **A :**
 - b) Insert new disk into your floppy drive (for example, drive B).
 - c) Format and make a copy of DOS operating system from your original disk to new disk by typing **FORMAT B : / S** and press **ENTER**.
 - d) Type **COPY ANSI.SYS B :** and press **ENTER**.
- Install E.V.R Adjustment Program onto formatted new disk with DOS operating system.
 - e) Take out original disk containing DOS operating system from your floppy drive (drive A) and insert disk containing E.V.R adjustment program into your floppy drive (drive A) and type **A :**
 - f) At the prompt, type **CD IBMPC** and press **ENTER**.
 - g) If required, type **COPY CONFIG.SYS B :** and press **ENTER**.
 - h) Type **CD PAL**.
 - i) Type **COPY ADJS.EXE B :** and press **ENTER**.
 - j) Type **CD SEQ** and press **ENTER**.
 - k) Type **COPY CL320E.SEQ B :** and press **ENTER**.
 - l) Type **CD** and press **ENTER**.
 - m) Type **CD EVR** and press **ENTER**.
 - n) Type **COPY *.EVR B :** and press **ENTER**.
 - o) After completing installation of program, you are ready to use E.V.R adjustment program.

Note :

When completed the new disk should be a bootable disk which contains the following files :

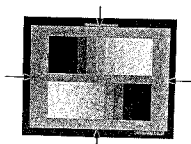
1. COMMAND CON
2. ANSI SYS
3. CONFIG SYS
4. ADJS EXE
5. CL320E SEQ
6. CL320E EVR
- CL322E EVR
- CL324E EVR

ADJUSTMENT PROCEDURE

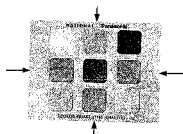
1. Test Equipment Required

The following test equipments are required for adjustment.

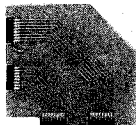
- Oscilloscope (50 MHz band width, dual trace, delayed with three probes)
- Vector scope
- Frequency counter
- Waveform monitor
- Under scanned color video monitor
- Lens: Automatic iris control lens such as WV-LA12 and manual iris lens
- Lighting (140 footcandles (1400 lux) 3200°K)
- Lux meter
- Signal generator (Black burst or Composite video signal)
- Color temperature conversion filter (C12, C4)
- Personal computer (IBM-PS2 or AT type)
- Standard straight RS-232C cable
- System Controller (WV-CU101, WV-CU254 or WV-CU300)
- Logarithmic gray scale chart (Part No. : YWV2310RB99)



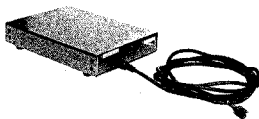
- Color chart (Part No. : YWV2100RB98)



- Extension board (Part No. : YWVKZCL32P1A)



- E.V.R Adjustment kit (Parts No. : YWVDEA0182AN)



2. Disassembling Procedure for Adjustment

- Remove two screws fixing camera mounting and remove camera mounting. (Fig. 2-1)

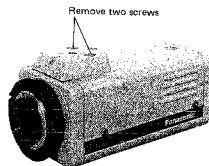


Fig. 2-1

- Remove six screws fixing upper cover and remove upper cover by pulling it upward. (Fig. 2-2)

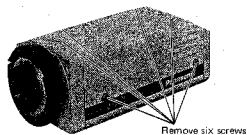


Fig. 2-2

- Remove two screws fixing bottom cover and remove bottom cover by pulling it down ward. (Fig. 2-3)

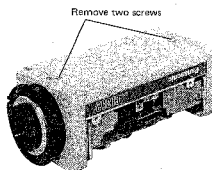


Fig. 2-3

- Remove four screws fixing digital board.

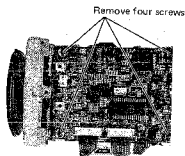


Fig. 2-4

- Fix two screws removing digital board as shown in Fig2-5.
- When adjusting the camera use extension board.
(Part No. : YWVKZCL32P1A)

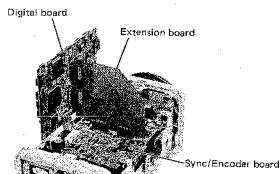


Fig. 2-5

3. CCD Image Sensor Replacement

- Remove upper and bottom covers while referring to the "2. Disassembling procedure for Adjustment" on page 28.
- Remove four screws fixing front chassis assembly. (Fig. 3-1)

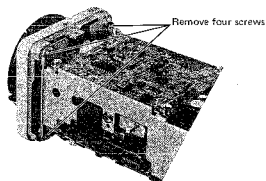


Fig. 3-1

- Disconnect CN1 from Drive board and remove two springs. (Fig. 3-2)

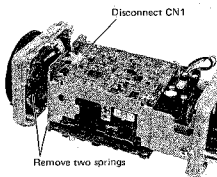


Fig. 3-2

- Remove one screws fixing earth lag and remove CCD image sensor assembly.



Fig. 3-3

4. Connection and Setting up for Adjustment

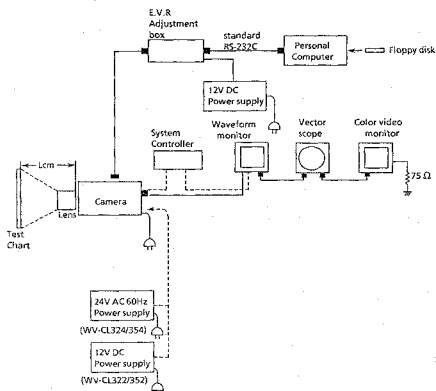


Fig. 4-1

Connection

- Connect the VIDEO OUTPUT connector on the rear of camera to color video monitor through waveform monitor and vectorscope using coaxial cable.
- Terminate color video monitor with 75 ohms.

Set up

- Set Lens Selection Switch on the side of camera to DC position

5. Adjustment Procedure

- Refer to page 46 for the Location of test points and adjusting control.

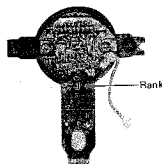
(1) V.Sub Adjustment

Test Point : Pin 14 (OFD) of IC1 Sensor board
Adjust : VR2 (V. SUB) Sensor board

- Check rank letter on CCD sensor assy.
- Connect digital volt meter to Pin 14 (OFD) of IC1 on Sensor board.
- Adjust VR2 (V. SUB) so that voltage becomes as shown in Table 1.

Rank	A	B	C	D	E	F	G	H	J	K
Voltage	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
Rank	L	M	N	P	Q	R	S	T	U	-
Voltage	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	-

Table-1



(2) VCO Adjustment (confirmation)

Test Point : TP1 (VCO) Drive board
Adjust : L12 (VCO) Drive board

- Connect digital voltmeter to TP1 (VCO) on the drive board.
- Confirm that voltage at TP1 is $2.3 \pm 0.1V$.
- If not, L12 (VCO) so that voltage becomes $2.3V \pm 0.1V$.

(3) External VCO Adjustment (confirmation)

Test Point : TP3 (EXT VCO) Sync board
Adjust : L5 (EXT VCO) Sync board

- Connect the VIDEO OUTPUT connector on the rear of camera to VIDEO (MULTIPLEX) INPUT connector of System Controller.
- Connect the digital voltmeter to TP3 (EXT VCO) on the sync board.
- Confirm that voltage at TP3 is $2.3 \pm 0.1V$.
- If not, adjust L5 (EXT VCO) so that voltage becomes $2.3V \pm 0.1V$.

(4) +9V Adjustment (VV-CL322 only)

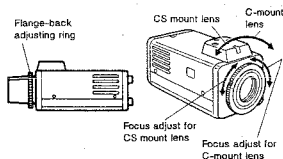
Test Point : TP1 (+9V) Power board
Adjust : VR1 (+9V) Power board

- Connect digital voltmeter to TP1 (+9V) on the Power board.
- Adjust VR1 (+9V) so that voltage becomes $+9V \pm 0.01V$.

(5) Flange-back adjustment

Test Point : Flange-back adjusting ring
Adjust : Color video monitor

- Aim the camera at dark object further than 10m.
- Set the lens focus to infinity (∞) position.
- Loosen the flange-back adjusting ring fixing screw and adjust the ring for best focus.
- Set between camera and object to 0.6m.
- Confirm that picture is in-focus. If not, re-adjust flangeback adjusting ring for best focus.
- Repeat above procedure until the focus tracks throughout the lens focus.
- Tighten the fixing screw.



E.V.R Adjustment

- Connect E.V.R Adjustment box to CN6 on the digital board using extension cable supplied.
- Connect E.V.R Adjustment box to IBM-PC (PS2 or AT type) using standard RS-232C cable.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI Co.
*****EVR*****
2.5VOLT ADJ.
3.SC FREQUENCY
4.VL SC FREQUENCY
0..LL V PHASE FOR 320,324
7.(A).LOW CLIP
7.(B).DB
8.(A).AGC OFF GAIN FOR ALC
8.(B).ALC DC
9.(C).TARGET2_IRIS FOR ALC
9.(D).TARGET1_IRIS FOR ALCALC
8.(E).TARGET1_ELC FOR ALC
8.(F).AGC OFF GAIN FOR ELC
8.(G).TARGET2_ELC FOR ELCALC
9.FREQUENCY
10.(A).V LEVEL L-byte
11.FREQUENCY L-byte
12.AGC ON(MAX GAIN)
13.L.BURST PHASE
13.L.BURST LEVEL
14.L.CARRIER Reb
<CONTENTS> 5.00+0.01 FOR ONLY 320,324
< INSTRUCTION > PLEASE CHOOSE MENU DATA BY ARROW-KEY
LOAD(F1)  QUIT(F3)  SAVE(F5)

```

- Insert new disk containing Dos operating system and E.V.R Adjustment Program into IBM-PC and turns on power of IBM-PC.
- At the prompt, type ADJS CL320E and press ENTER, following initial menu for adjustment will be displayed.
- Press LOAD (F1) and type CL320E, EVR (if using WV-CL320E), and press ENTER for presetting adjustment of the camera.
- After finishing, the message ERROR 14 SCK NGI will be displayed, but this is normal.
- Press ENTER for starting adjustment, following adjusting screen will be displayed.

NOTE:

- EEPROM mentioned in this adjustment procedure is IC7 on digital board.
- RAM mentioned in this adjustment procedure is IC10 on digital board.

(5) +5V adjustment (WV-CL320/324 only)

Test Point : TP4 (+5V) Drive board
Adjust : EEPROM (3D)

- Press ENTER key.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI Co.
*****EVR*****
2.5VOLT ADJ.
5.00+0.01 FOR ONLY 320,324
*****EVR*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 00
<DATA> : 80 - 80
<MESSAGE> :
<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLODOWN : PREVIOUS ITEM
LOAD(F1)  QUIT(F3)  SAVE(F5)

```

- Connect digital voltmeter to TP4 (+5V).
- Adjust data by ARROW keys so that voltage becomes +5.0V $\pm$ 0.01V.
- Press ENTER key for next adjustment.

(7) Sub carrier frequency adjustment

Test Point : TP7 (SC) Sync board
Adjust : EEPROM (3F)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI Co.
*****EVR*****
3.SC FREQUENCY
TP7 (SC) 1870KHz 4.13618+5Hz
*****EVR*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 01F
<DATA> : 4C - 4C
<MESSAGE> :
<INSTRUCTION> ADJUST DATA BY ARROW-KEY. ROLLODOWN : PREVIOUS ITEM
LOAD(F1)  QUIT(F3)  SAVE(F5)

```

- Connect frequency counter to TP7 (SC).
- Adjust data with ARROW keys so that sub carrier frequency becomes 4.433618 MHz $\pm$ 5 Hz.
- Press ENTER key for next adjustment.

(8) Line Lock V.phase adjustment (WV-CL320/324 only)

Test Points: VIDEO OUTPUT connector
AC Input terminal Power board
Adjusts : RAM (18C)
VR1(V. PHASE) Power board

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI Co.
*****EVR*****
6..LL V PHASE FOR 320,324
SKIP THIS IF CL355, CL322
*****EVR*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 18A
<DATA> : 8E - 8E
<MESSAGE> :
<INSTRUCTION> ADJUST DATA BY ARROW-KEYS. ROLLODOWN : PREVIOUS ITEM
LOAD(F1)  QUIT(F3)  SAVE(F5)

```

- Connect 2 probes of oscilloscope to VIDEO OUTPUT connector and AC input terminal on power board.
- Set the oscilloscope to V rate.
- Adjust data by ARROW keys so that decay point of V sync signal delays 2H $\pm$ 1H from zero cross point of AC power source as shown in Fig. 5-3.

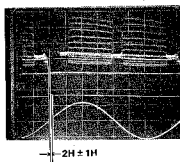


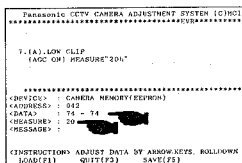
Fig. 5-3

- Press ENTER key.

(9) Low clip adjustment

Test Point : RAM (D2)

Adjust : EEPROM (42)

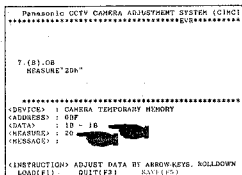


- Confirm that lens iris closes.
- Adjust data by ARROW keys so that measure level becomes 20.
- Press ENTER key.

(10) OB adjustment

Test Point : RAM (D2)

Adjust : EEPROM (BF)



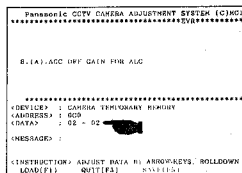
- Confirm that lens iris closes.
- Adjust data by ARROW keys so that measure level becomes 20.
- Repeat adjustment (9) and (10) until both measure levels become 20.
- Press ENTER key.

(11) AGC OFF gain adjustment

Test Point : Pin 3 (AGC OUT) of CNS

Digital board

Adjust : RAM (C0) IC10



- Change lens from automatic iris control lens to manual iris lens.
- Connect oscilloscope to pin 1 (CDS OUT) of CNS on digital board.
- Aim the camera at logarithmic gray scale chart.
- Adjust lens iris so that CDS output signal at pin 1 of CNS becomes 460 mV as shown in Fig. 5-4.

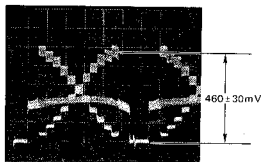


Fig. 5-4

- Change oscilloscope from pin 1 of CNS to pin 3 of CNS.
- Adjust data by ARROW keys so that signal level becomes 600 ± 30 mV as shown in Fig. 5-5.
- Change lens from manual iris lens to automatic iris control lens.

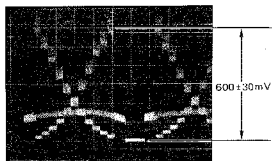


Fig. 5-5

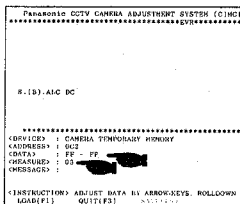
- Press ENTER key.

(12) ALCDC adjustment

Test Point : RAM (D5)

Adjust : RAM (C2)

Note : Installed lens should be DC servo type for this adjustment.



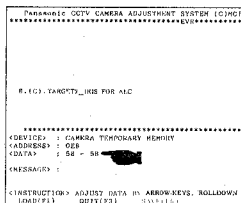
- Aim the camera at logarithmic gray scale chart.
- Adjust data by ARROW keys so that measure level becomes between 03 and 04.
- Press ENTER key.

(13) BLC preset OFF (Target 2 iris) adjustment

Test Point : Pin 1 (CDS OUT) of CN5

Digital board

Adjust : RAM (E8) IC10



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 (CDS OUT) of CN5.
- Adjust data by ARROW keys so that signal level becomes 460 ± 30 mV as shown in Fig. 5-6.

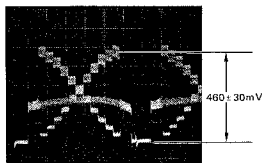


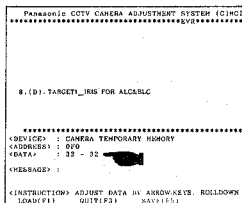
Fig. 5-6

(14) BLC preset ON (Target 1 iris) adjustment

Test Point : Pin 1 (CDS OUT) of CN5

Digital board

Adjust : RAM (F0) IC10



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 (CDS OUT) of CN5.
- Adjust data by ARROW keys so that signal level becomes 460 ± 30 mV as shown in Fig. 5-7.

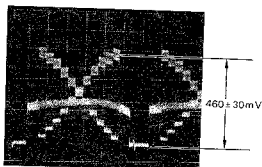


Fig. 5-7

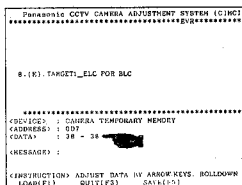
- Press ENTER key.

(15) BLC Preset ON (Target 1 ELC) adjustment

Test Point : Pin 3 (AGC OUT) of CNS

Digital board

Adjust : RAM (D7)



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 3 of CNS.
- Adjust data by **ARROW** keys so that signal level becomes 460 ± 30 mV as shown in Fig. 5-8.

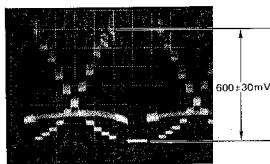


Fig. 5-8

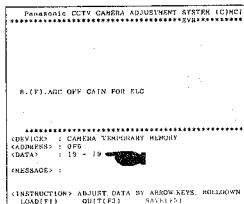
- Press **ENTER** key.

(16) AGC OFF gain (ELC) adjustment

Test Point : Pin 1 (CDS OUT) of CNS

Digital board

Adjust : RAM (F6) IC10



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 of CNS.

- Adjust data by **ARROW** keys so that signal level becomes 460 ± 30 mV as shown in Fig. 5-9.

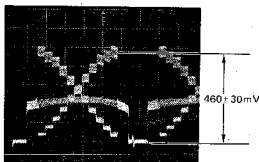


Fig. 5-9

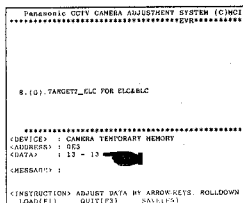
- Press **ENTER** key.

(17) BLC preset OFF (Target 2 ELC) adjustment

Test Point : Pin 1 (CDS OUT) of CNS

Digital board

Adjust : RAM (E3)



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 of CNS.
- Adjust data by **ARROW** keys so that signal level becomes 460 ± 30 mV as shown in Fig. 5-10.

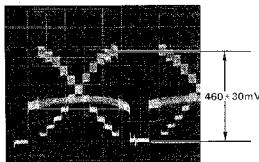


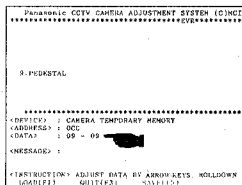
Fig. 5-10

- Press **ENTER** key.

(18) Pedestal adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM(CC)



- Confirm that lens iris closes.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUTPUT connector.
- Adjust data by ARROW keys so that signal level becomes 50 ± 5 mV as shown in Fig. 5-11.

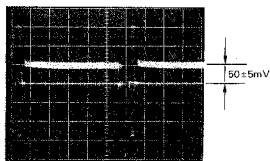


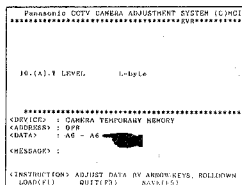
Fig. 5-11

- Press ENTER key.

(19) Y. level adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM(F8)



- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUTPUT connector.

- Adjust data by ARROW keys so that signal level becomes 700 ± 50 mV (98 ± 7 IRE) as shown in Fig. 5-12.

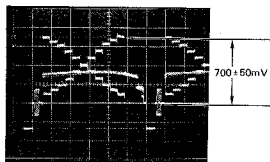


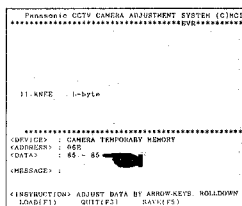
Fig. 5-12

- Press ENTER key.

(20) Knee level adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM(6E)



- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUTPUT connector
- Adjust data by ARROW keys so that signal level becomes $840 +35mV -0$ ($117 +5 -0$ IRE) as shown in Fig. 5-13.

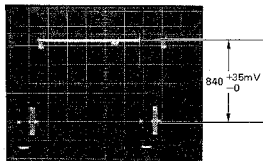
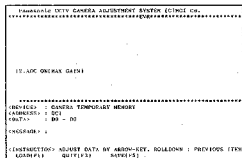


Fig. 5-13

(21) AGC ON (Max gain) adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM (C1)



- Change lighting from 1400 lux to 3 lux
 - Aim the camera at logarithmic gray scale chart.
 - Adjust data by **ARROW** keys so that signal level becomes $280 \pm 35 \text{ mV}$ ($39.2 \pm 4.9 \text{ IRE}$), and note this data as (a).
 - Re-adjust data by **ARROW** keys so that data becomes (b).
- (a)-30h = (b)

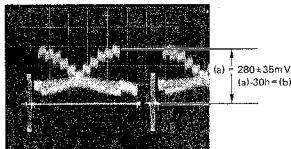


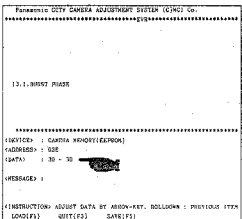
Fig. 5-14

- Change lighting from 3 lux to 1400 lux.
- Press **ENTER** key.

(22) Burst phase adjustment

Test Point : VIDEO OUTPUT connector

Adjust : EEPROM (3E)



- Adjust data by **ARROW** keys so that burst phase becomes 135° .

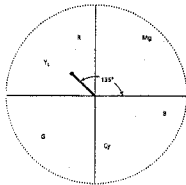


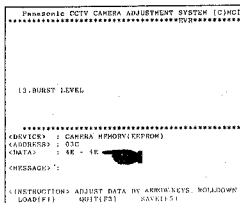
Fig. 5-15

- Press **ENTER** key.

(23) Burst level adjustment

Test Point : VIDEO OUTPUT connector

Adjust : EEPROM (3C)



- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that burst level becomes $300 \pm 10 \text{ mV}$ ($42 \pm 1.4 \text{ IRE}$) as shown in Fig. 5-16.

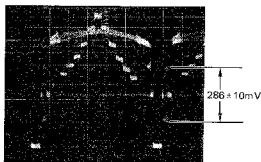


Fig. 5-16

- Press **ENTER** key.

(24) R. B carrier balance adjustment

Test Point : VIDEO OUTPUT connector

Adjust : C. DSP (17)

C. DSP (18)

- Set the gain of vectorscope to maximum.

(25) R. Carrier balance adjustment (AGC-OFF)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EV*****

14.1.CARRIER Bal.
(AGC OFF), REPEAT THIS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 017
<DATA> : 05 - 05
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by ARROW keys so that vector positions at the center of vectorscope.
- Press ENTER key.

(26) B. Carrier balance adjustment (AGC-OFF)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EV*****

14.2.CARRIER Bal.
(AGC OFF), REPEAT THIS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 018
<DATA> : 06 - 06
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by ARROW keys so that vector positions at the center of vectorscope.
- Press ENTER key.
- If the vector does not position at the center of vectorscope, press PG DN key twice to return to (14)-1, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-17.

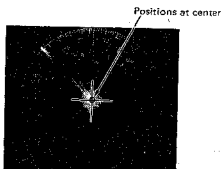


Fig. 5-17

(27) R. Carrier balance adjustment (AGC-ON)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EV*****

14.3.CARRIER Bal.
(AGC ON), REPEAT PREVIOUS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 017
<DATA> : 05 - 05
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by ARROW keys so that vector positions at the center of vectorscope
- Press ENTER key.

(28) B Carrier balance adjustment (AGC-ON)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EV*****

14.4.CARRIER Bal.
(AGC ON), REPEAT PREVIOUS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 018
<DATA> : 06 - 06
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the center of vectorscope, press **PG DN** key twice to return to (14)-3, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-18.

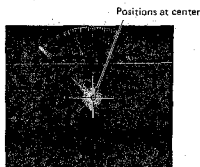


Fig. 5-18

(29) White balance manual offset adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM (8C)
RAM (8D)

- Aim the camera at white chart.
- Set the gain of vectorscope to maximum.

(30) R. White balance manual offset adjustment

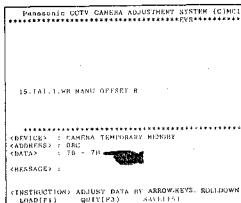
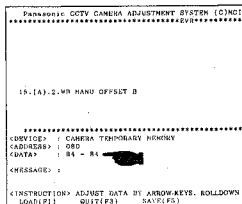


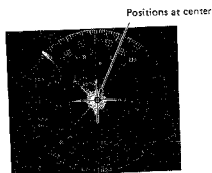
Fig. 5-19

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.

(31) B. White balance manual offset adjustment



- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the center of vectorscope, press **PG DN** key twice to return to (15)-A-1, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-19.



(32) ATW offset adjustment

Test Point : VIDEO OUTPUT connector

Adjust : EEPROM (40) IC7
EEPROM (41) IC7

- Aim the camera at white chart.
- Set the gain of vectorscope to maximum.

(33) R. ATW offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM [C]MCI
*****EVR*****

15. (B).1.WB ATW OFFSET R

*****
<DEVICE> : CAMERA MONITOR (EYPHON)
<ADDRESS> : 040
<DATA> : 59 - 59
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEYS, ROLLDOWN
LOAD(F1) QUIT(F2) SAVE(F3)

```

- Adjust data by ARROW keys so that vector positions at the center of vectorscope.
- Press ENTER key.

(34) B. ATW offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM [C]MCI
*****EVR*****

15. (B).2.WB ATW OFFSET B

*****
<DEVICE> : CAMERA MONITOR (EYPHON)
<ADDRESS> : 041
<DATA> : 58 - 58
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEYS, ROLLDOWN
LOAD(F1) QUIT(F2) SAVE(F3)

```

- Adjust data by ARROW keys so that vector positions at the center of vectorscope.
- Press ENTER key.
- If the vector does not position at the center of vectorscope, press PG DN key twice to return to (15)-B-1, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-20.

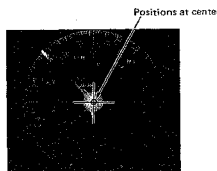


Fig. 5-20

(35) ATW limit adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM (8A)

RAM (8B)

- Aim the camera at white chart.
- Set CC filter (C12 + C4) which converts from 3200°K to 6500°K in front of lens.

(36) R. ATW offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM [C]MCI
*****EVR*****

15. (C).1.WB ATW LIMIT Bch

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 00A
<DATA> : 30 - 30
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEYS, ROLLDOWN
LOAD(F1) QUIT(F2) SAVE(F3)

```

- Adjust data by ARROW keys so that vector positions at the center of vectorscope
- Press ENTER key.

- Adjust data by **ARROW** keys so that both red vectors match ($0 \pm 1^\circ$).
- Press **ENTER** key.
- If the chrominance phase and gain should not be adjusted to proper position, press **PG DN** key 3 times to return to (16)-A-1, and repeat above procedure until they are adjusted to proper position as shown in table -2.

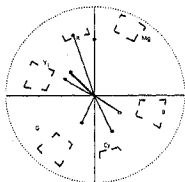


Fig. 5-22

	Red	Yellow
Phase	$104 \pm 2^\circ$	$157 \pm 5^\circ$
gain	$200 \pm 5\%$	$100 \pm 5\%$

Table-2

(42) White balance adjustment (5100°K)

Test Point : VIDEO OUTPUT connector

Adjust : RAM(90)

RAM(91)

- Aim the camera at color chip chart.
- Set CC filter (C12) which converts from 3200°K to 5100°K in front of lens.

(43) R. Gain adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVEN*****

16.(1B).J.5100K R_GAIN

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 001
<DATA> : 03 - 03
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS, ROLLODOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that red gain becomes $200 \pm 5\%$ (Burst = 100%).
- Press **ENTER** key.

(44) B. Gain adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****EVEN*****

16.(1B).J.5100K B_GAIN

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 001
<DATA> : 08 - 08
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS, ROLLODOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that yellow gain becomes $90 \pm 5\%$ (Burst = 100%).
- Press **ENTER** key.
- If the chrominance gain and phase should not be adjusted to proper position, press **PG DN** key twice to return to (16)-B-1, and repeat above procedure until they are adjusted to proper position as shown in table 3.

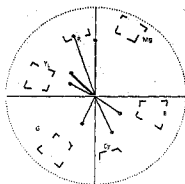


Fig 5-23

	Red	Yellow
Phase	$104 \pm 2^\circ$	$157 \pm 5^\circ$
gain	$200 \pm 5\%$	$90 \pm 5\%$

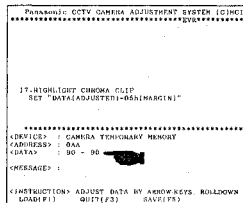
Table-3

- Remove CC filter (C12) from in front of lens.

(45) Highlight chroma clip

Test Point : VIDEO OUTPUT connector

Adjust : RAM(AA)



- Aim the camera at white chart.
- Adjust data by **ARROW** keys so that chrominance level becomes just minimum, and note this data as (a).
- Re-adjust data by **ARROW** keys so that data becomes (b).

(a)-05h = (b)

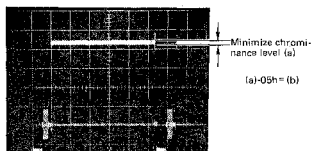
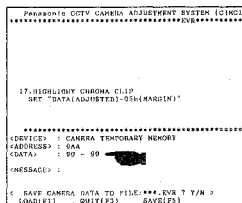


Fig-5-24

- After finishing adjustment, press **QUIT (F3)**.



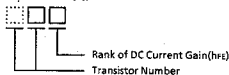
- Press **N** and **ENTER** to finish

- Disconnect cable from CN6 on the digital board.
- Confirm that masking is off.
- If not, set the masking off while referring to page 7
- Press Right (8), Left (9) and Set (11) Switches on the rear panel at the same time for resetting.

CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.



Transistor Number

(Chip Transistor)

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1A	2SB799
E	2SA1022	1B	2SB814
F	2SA1034	1C	2SB902
H	2SA1035	1F	2SK321
I	2SB792	1K	2SK316
K	2SC2778	1L	2SK247
P	2SD814	1M	2SJ84
Q	2SD813	1N	2SK199
R	2SC2480	1O	2SK198
S	2SC2405	1T	2SC3077
T	2SC2406	1X	2SC2845
U	2SC2404	1Z	2SD1030
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

(Small Chip Transistor)

Letter	Transistor No.
A	2SB1218
U	2SC3931
W	2SD1820
Y	2SD1819
E3	2SA1226
OS	2SB1219
UC	2SA1532
YU	2SC3938

(Pair Transistor)

Letter	Transistor No.
5C	XN4601
5N	XN6501
5O	XN6401

Example :
 WQ → 2SD602 - Q
 YQ → 2SD601 - Q
 1BS → 2SB814 - S

Appearance and Symbols

Transistor



C: Collector
 B: Base
 E: Emitter

FET



	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

Appearance and Symbols

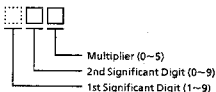


Anode → Cathode

	1	2	3
MA28/MA28W/MA28T	-	Anode	Cathode
MA151K/MA152K	-	Anode	Cathode
MA151A/MA152A	-	Cathode	Anode
MA151WA/MA152WK	Anode	Anode	Cathode
MA151WK/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



Example :
 330 → $33 \times 10^0 = 33 \text{ ohms}$
 561 → $56 \times 10^1 = 560 \text{ ohms}$
 123 → $12 \times 10^3 = 12 \text{ ohms}$

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

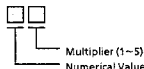
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

Example :

0.5	→	0.5 pF	2.5	→	2.5 pF
75	→	0.75 pF	33	→	33 pF
1	→	1 pF	82	→	82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	O	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

*Letters I and O are not used

Example :

A1	→	$10 \times 10^1 = 100 \text{ pF}$
N2	→	$33 \times 10^2 = 3300 \text{ pF}$
S3	→	$47 \times 10^3 = 47000 \text{ pF}$

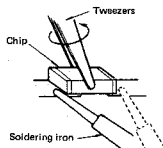
5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.

Note : Be careful not to damage other chips.

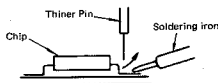


5-2 Removal (IC)

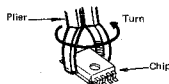
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thinner pin.

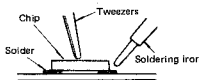


3. Remove IC turning it with plier.

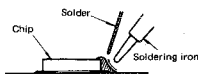


5-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

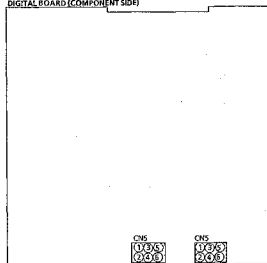


3. Solder both ends of chip (three leads for chip transistor).

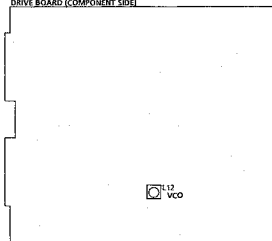


LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

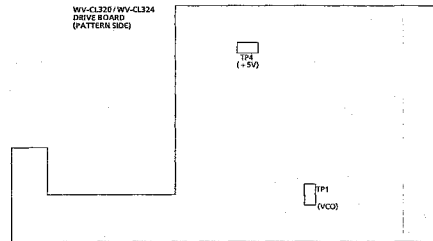
DIGITAL BOARD (COMPONENT SIDE)



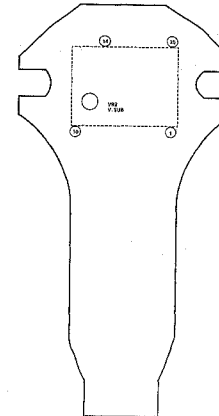
WV-CL322
DRIVE BOARD (COMPONENT SIDE)



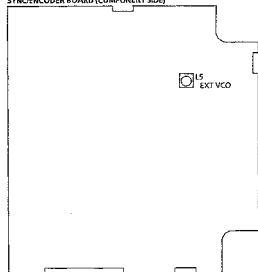
WV-CL326 / WV-CL324
DRIVE BOARD
(PATTERN SIDE)



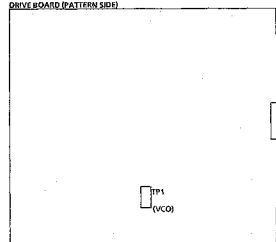
SENSOR BOARD



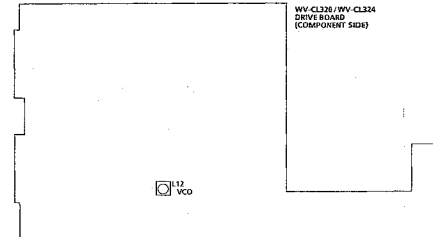
SYNC/ENCODER BOARD (COMPONENT SIDE)



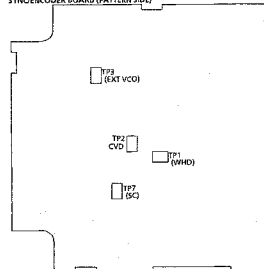
WV-CL322
DRIVE BOARD (PATTERN SIDE)



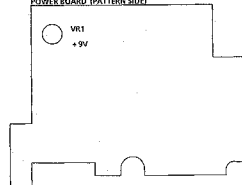
WV-CL326 / WV-CL324
DRIVE BOARD
(COMPONENT SIDE)



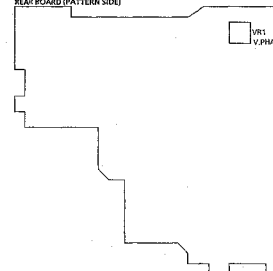
SYNC/ENCODER BOARD (PATTERN SIDE)



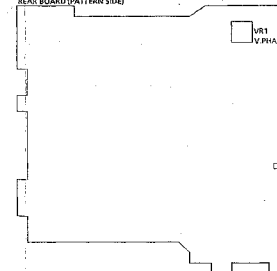
WV-CL322
POWER BOARD (PATTERN SIDE)



WV-CL326
REAR BOARD (PATTERN SIDE)

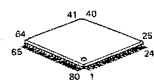


WV-CL324
REAR BOARD (PATTERN SIDE)



APPEARANCE OF IC, TRANSISTOR AND DIODE

MN73069LBMZ
MN6730FHP
MN6731FHP
MN188165CCV2



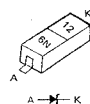
NJM319M



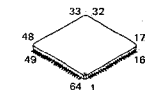
Z5B1218-QR5
Z5B1462
Z5CA618
Z5CA4627
Z5D2216
FA3L42T18



MA372



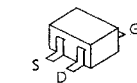
AN2254FAP
NM65701FHP
YWM8621488U



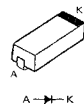
YWCKA1439M
NJM2904M
NJM3414M
NJM4558M



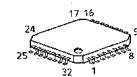
Z5K622-PQR



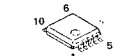
YWF1H4TP



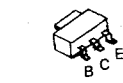
AN2015FAP



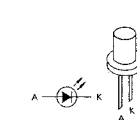
YWM6M80021FP
YWM62352GP



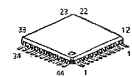
Z5B766-R5
Z5D875-QR5



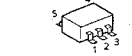
LN277RPX



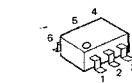
MN53020LB01



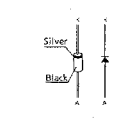
YWTC75085
YWTC7532FR
YWTC4569F
YWM5237ML



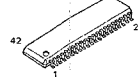
XP1501
XP4501



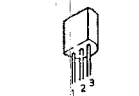
YWERA1502



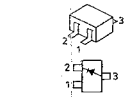
M50554254PF



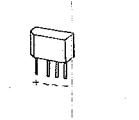
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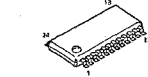
MA132K



YWS1V640



YWCK01175AM



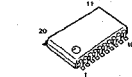
YWMA1020



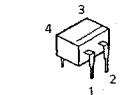
MA133



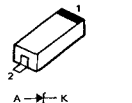
MN53003LB



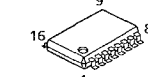
PS25011KL



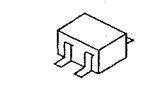
MA8110
MA8200



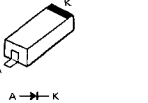
YWUPD16501GS

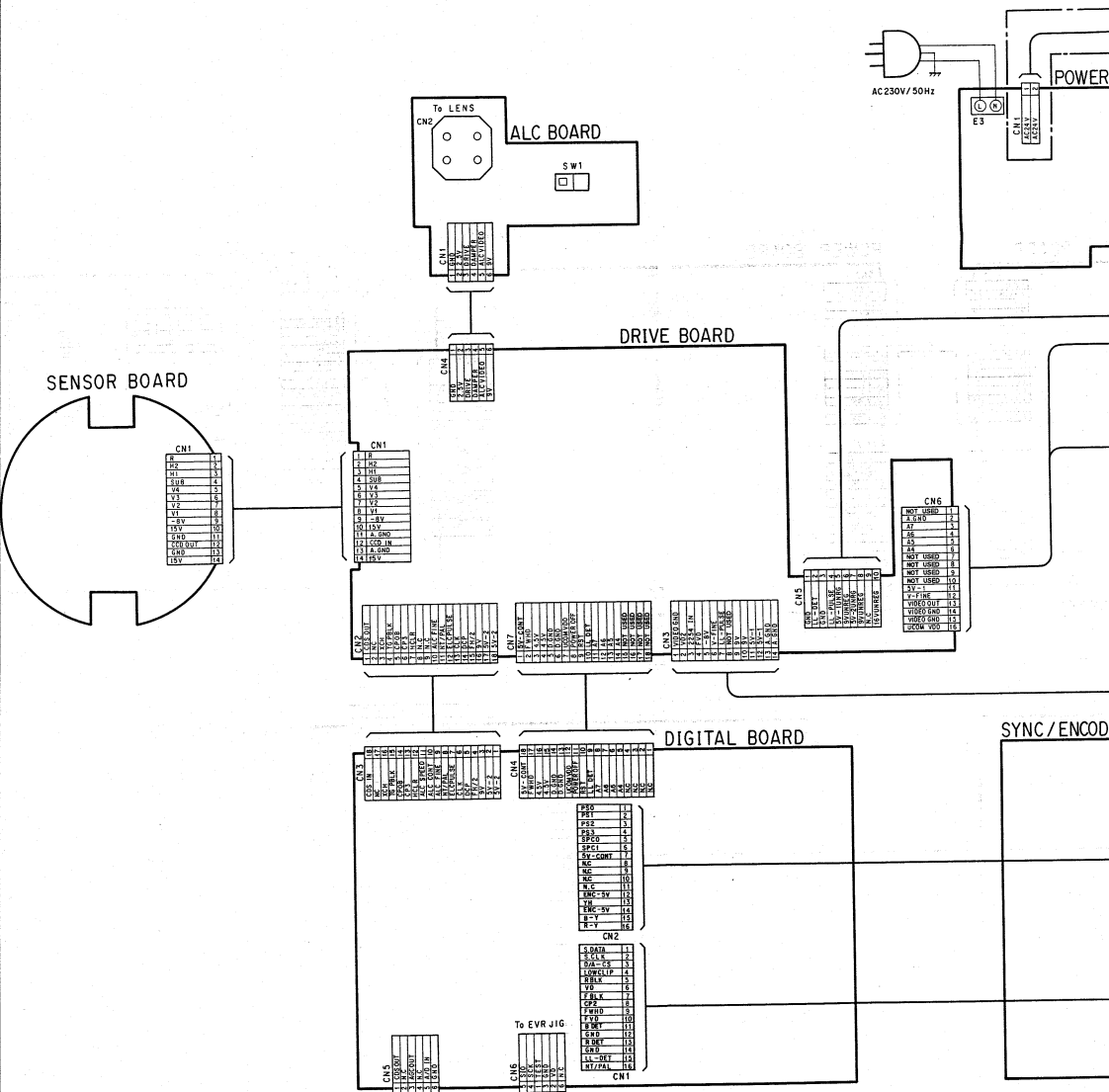


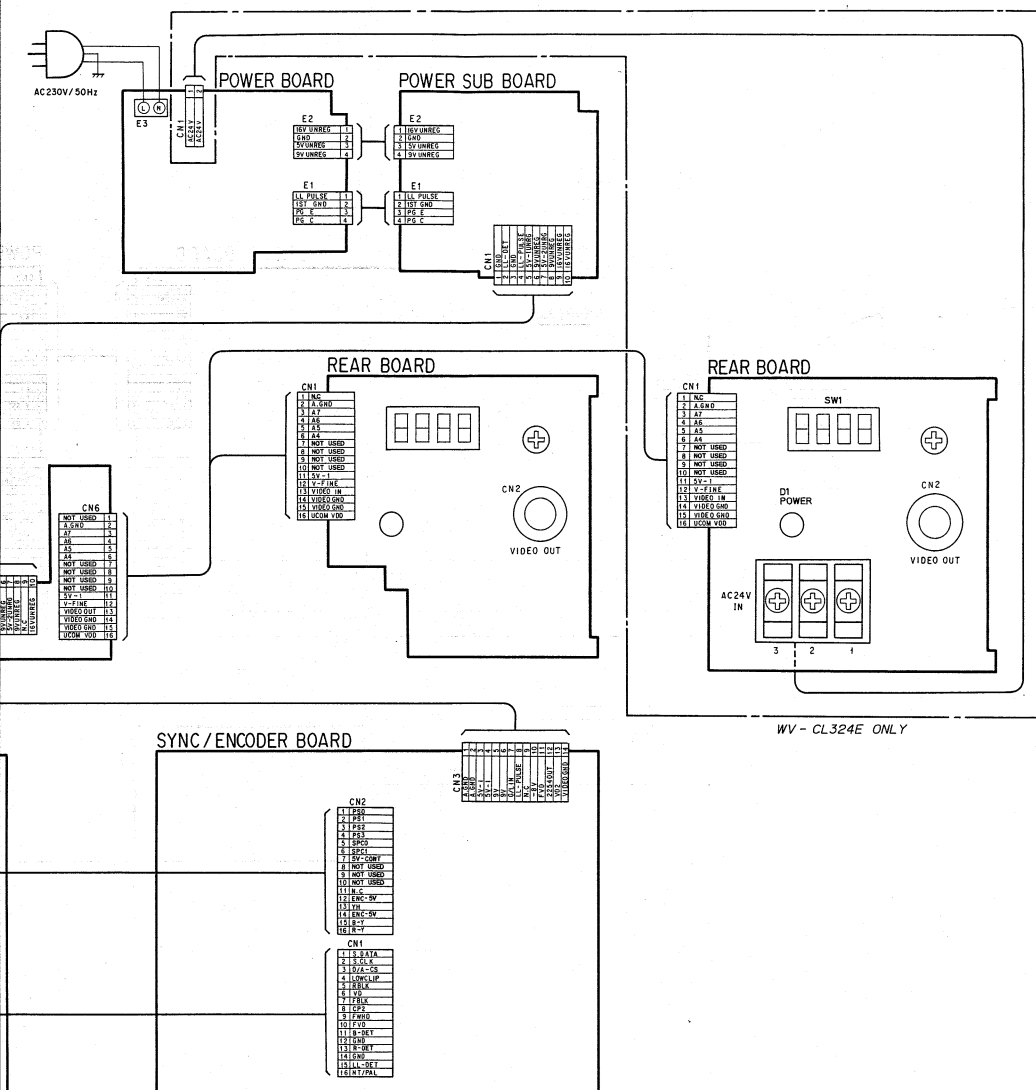
MN13821PQR



MA729







WIRING DIAGRAM OF WV-C

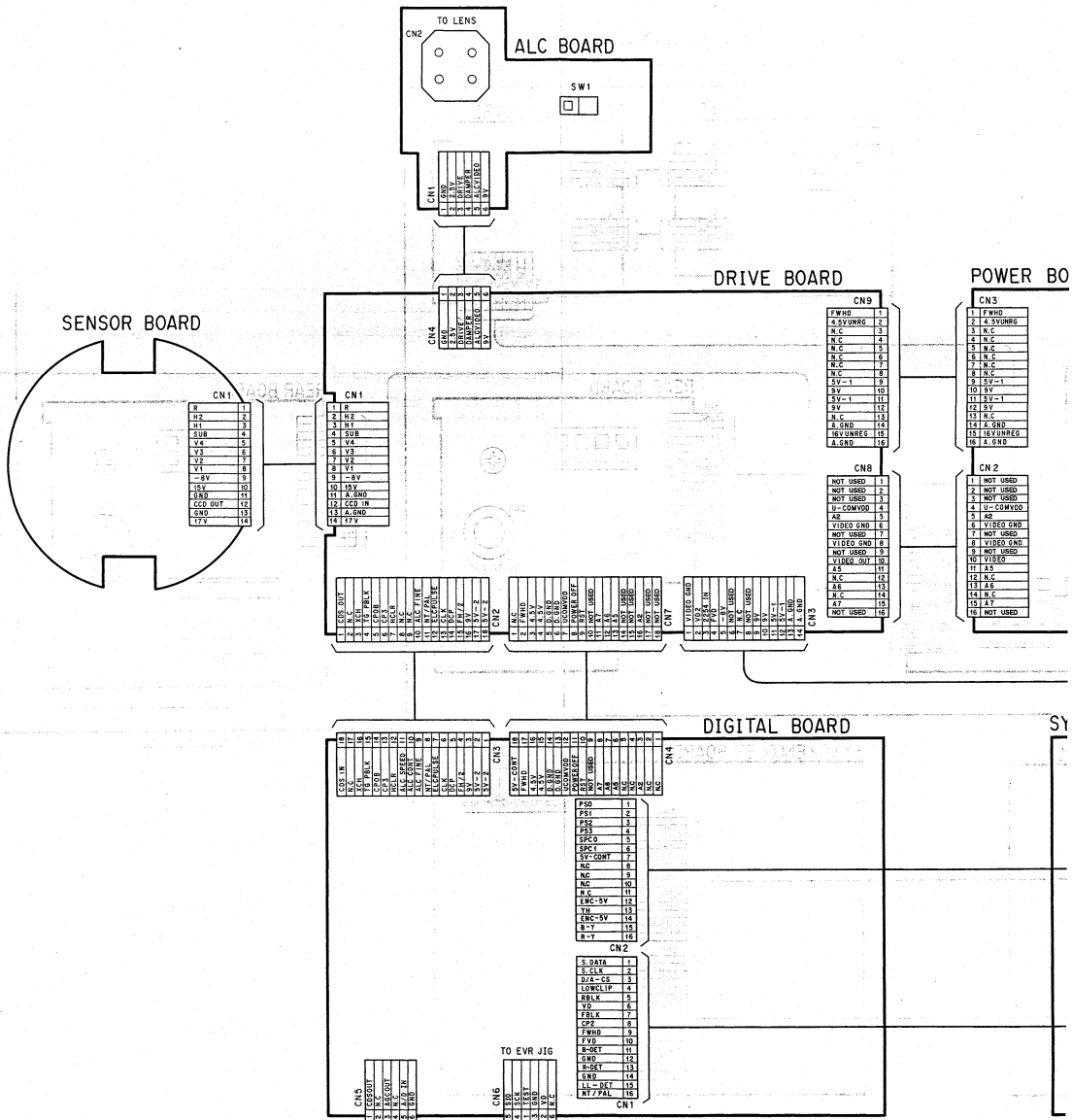
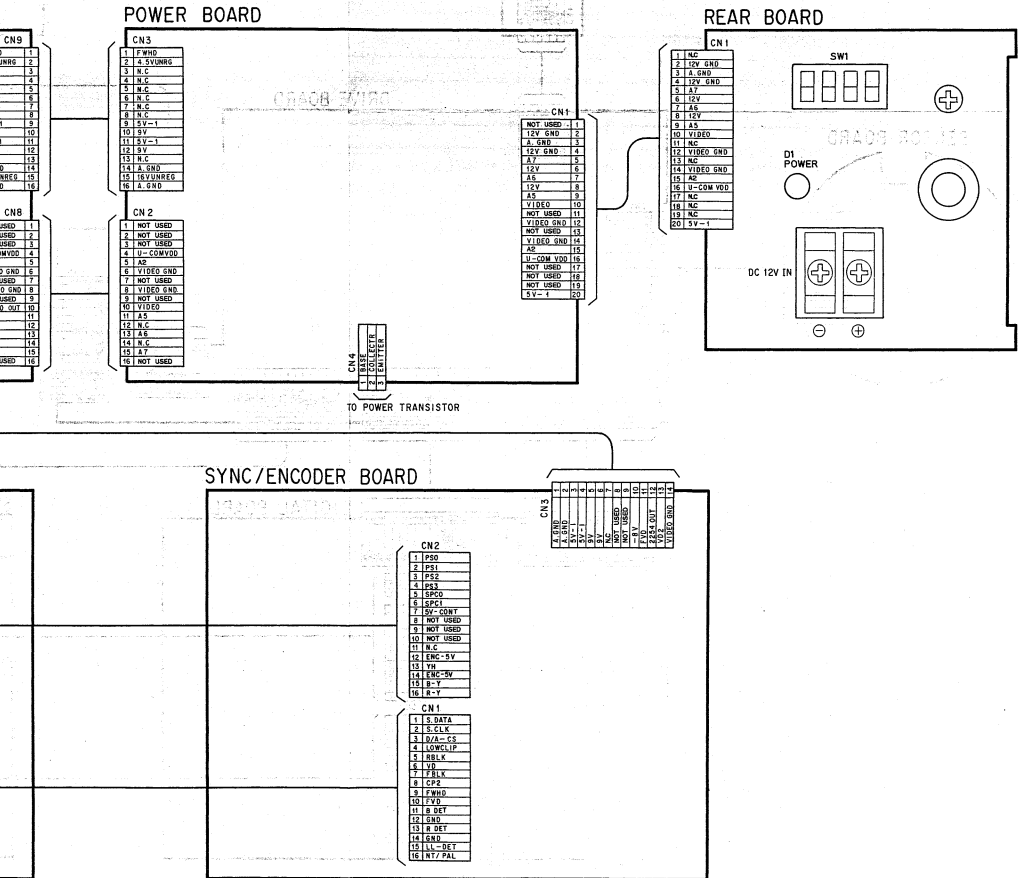
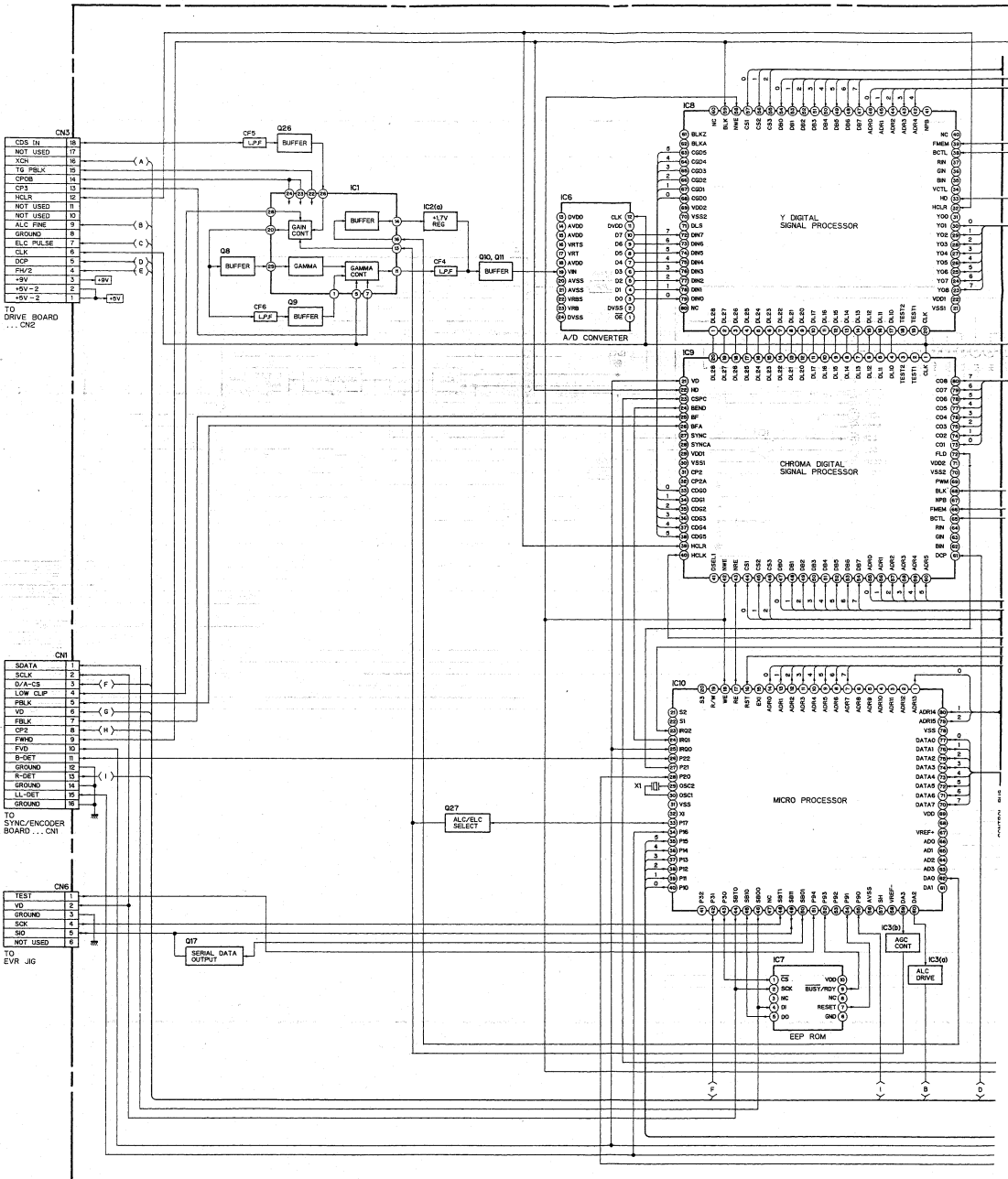


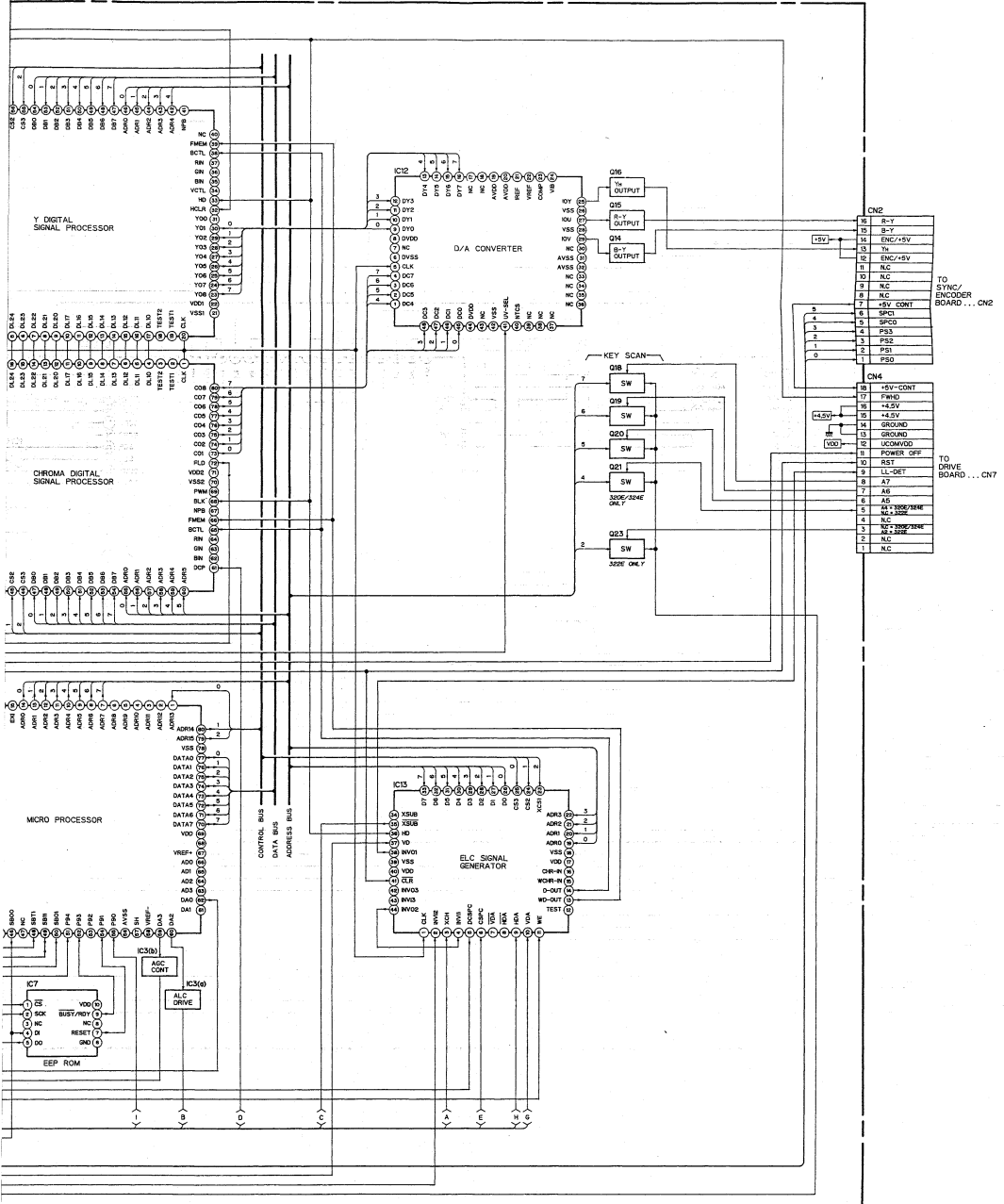
DIAGRAM OF WV-CL322



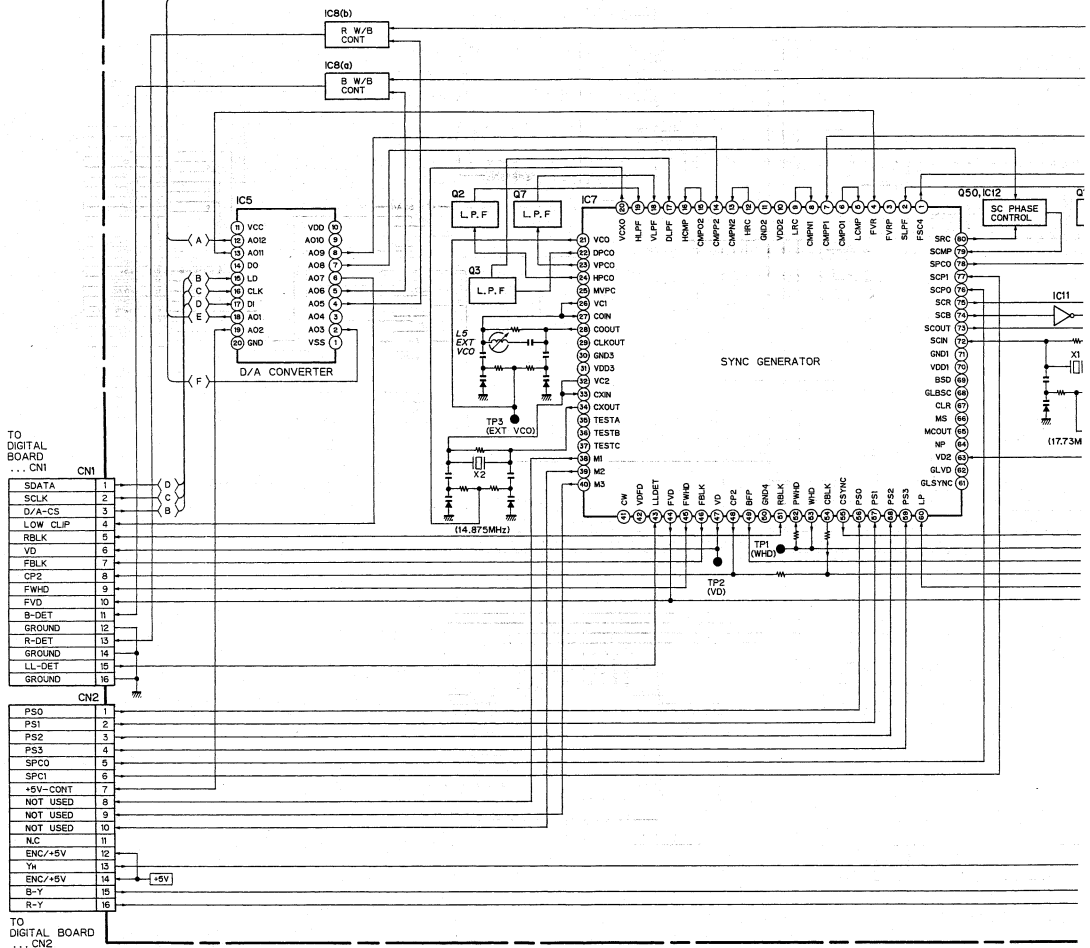
DIGITAL BOARD



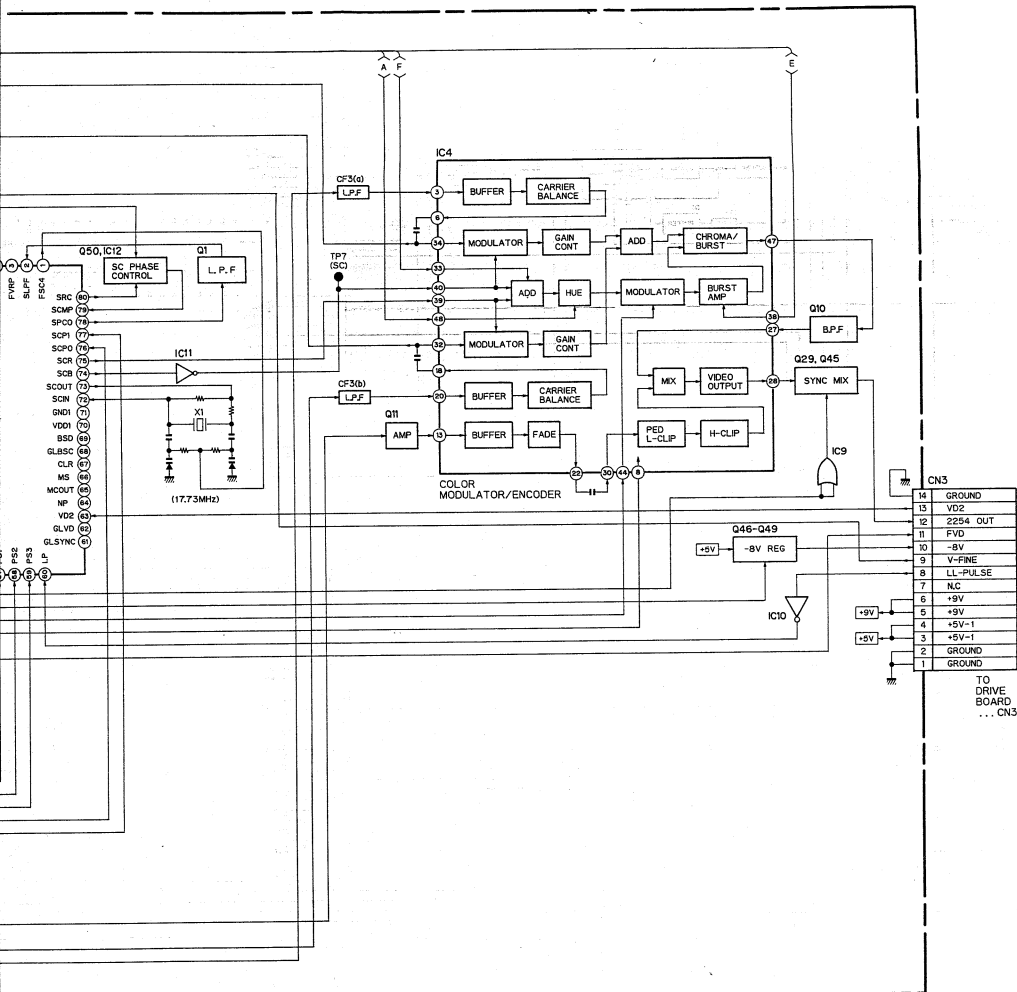
GRAM OF DIGITAL BOARD



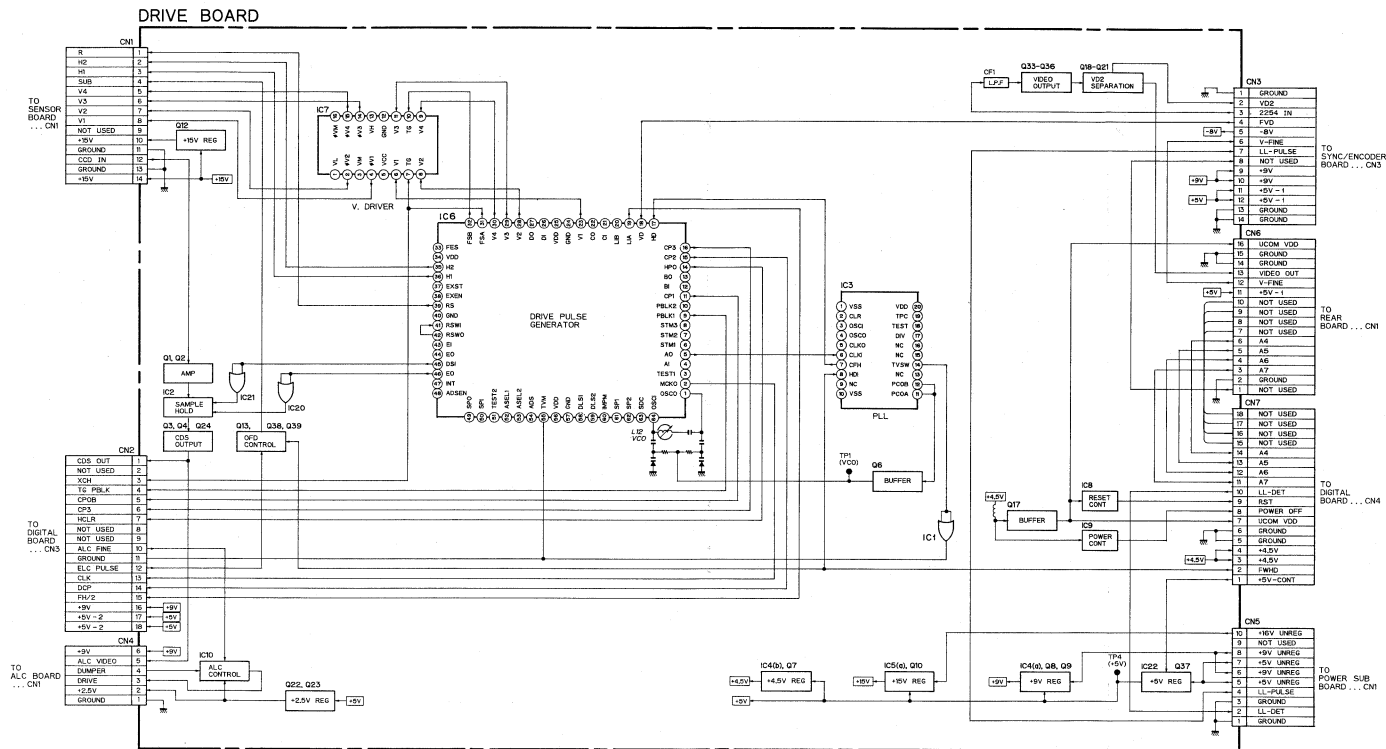
SYNC/ENCODER BOARD



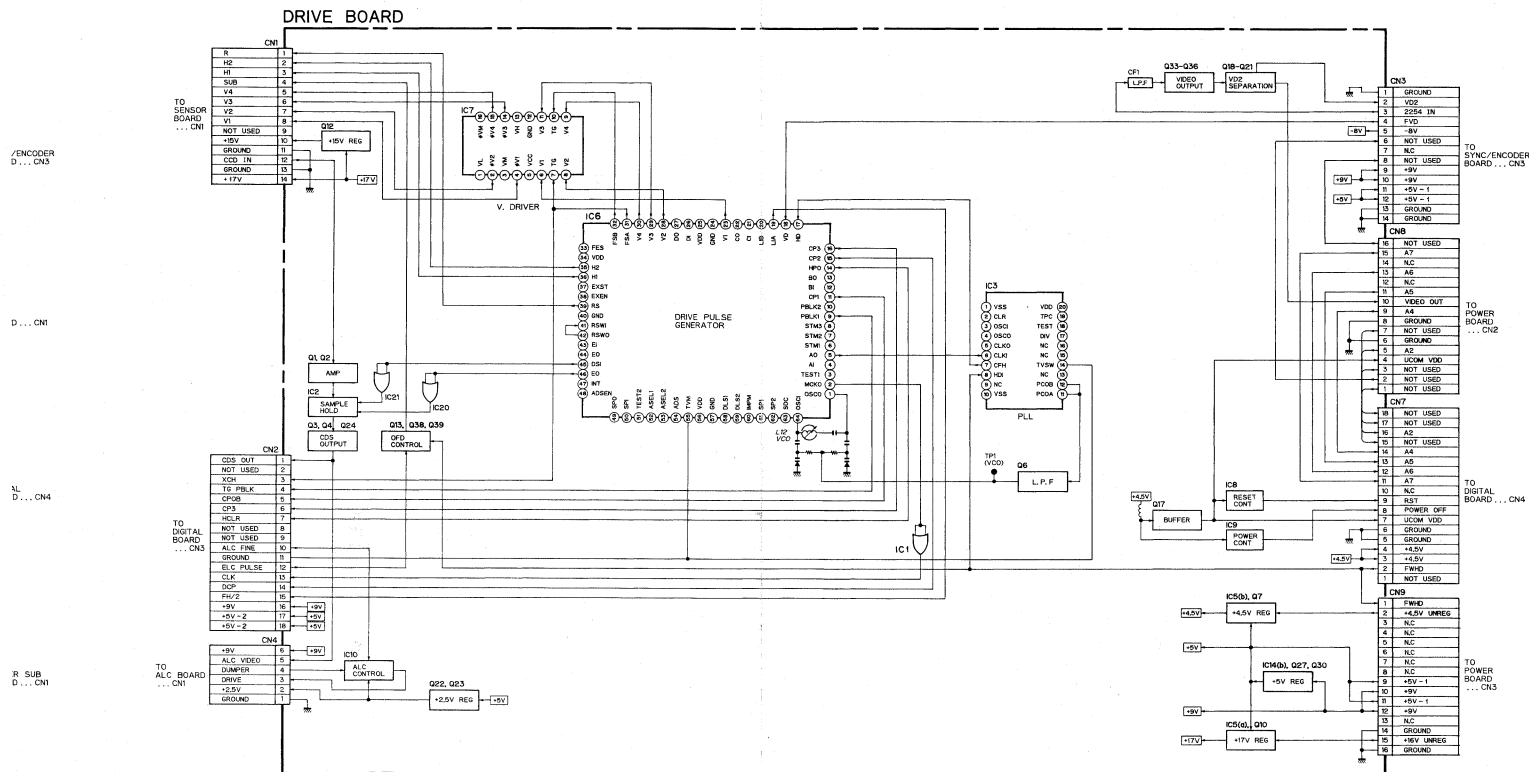
AM OF SYNC/ENCODER BOARD



BLOCK DIAGRAM OF DRIVE BOARD (WV-CL320/WV-CL324)

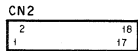
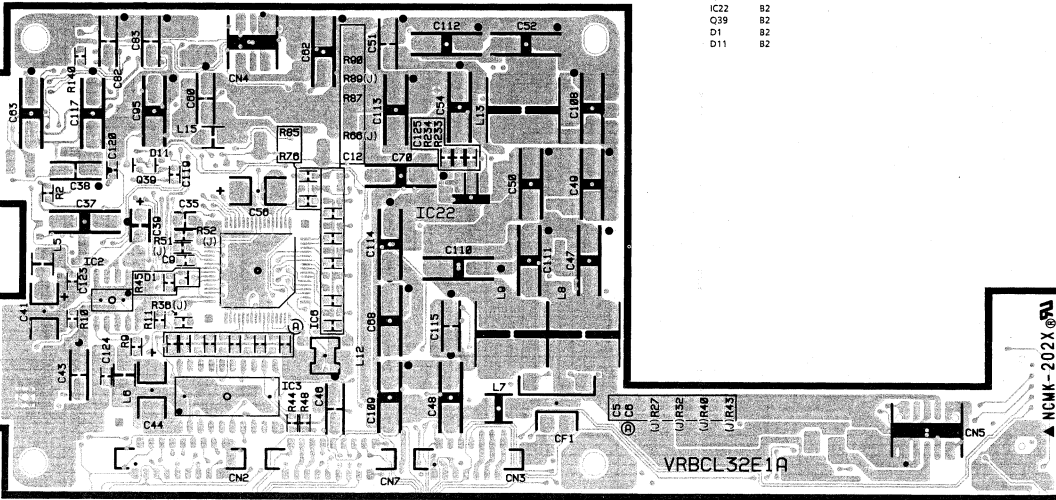


BLOCK DIAGRAM OF DRIVE BOARD (WV-CL322)

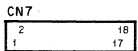


DRIVE BOARD

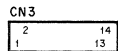
To
ALC BOARD
--- CN1



To
DIGITAL BOARD
--- CN3



To
DIGITAL BOARD
--- CN4



To
SYNC/ENCODER BOARD
--- CN3



To
POWER SUB BOARD
--- CN1

(COMPONENT SIDE)

(COMPONENT SIDE)

<Index>
DRIVE BOARD
COMPONENT SIDE

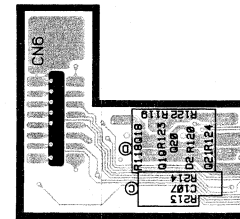
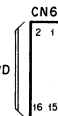
IC2 B1
IC3 A1,B2
IC B2
IC22 B2
Q39 B2
D1 B2
D11 B2

(PATTERN SIDE)

<Index>
DRIVE BOARD
PATTERN SIDE

IC1 B10
IC4 C8
IC5 C8
IC7 C9
IC8 B9
IC9 B9
IC10 C10
IC20 B10
IC21 B10
Q1 A8
Q2 B10
Q3 B10
Q4 B10
Q6 A9
Q7 C8
Q8 C8
Q9 B8
Q10 C9
Q12 C10
Q13 C9
Q17 B9

To
REAR BOARD
--- CN1

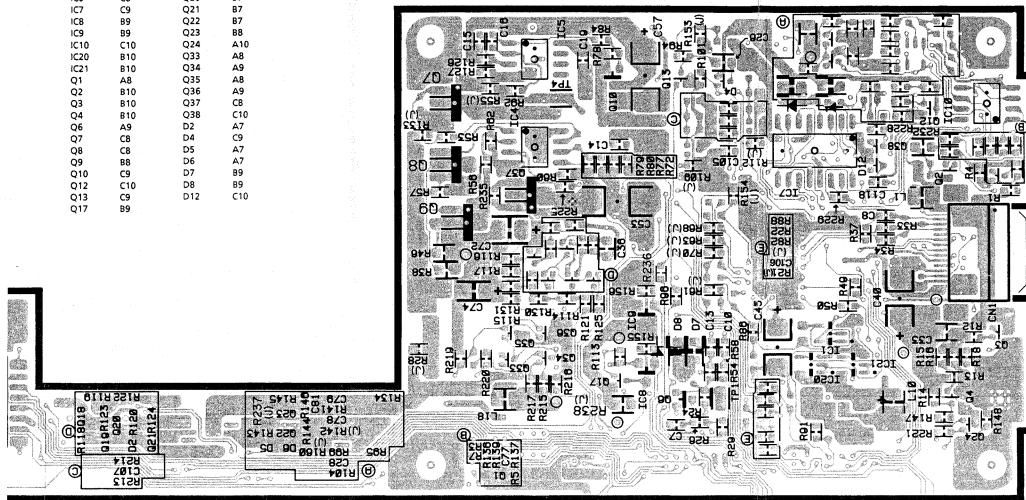


(PATTERN SIDE)

<Index>
 DRIVE BOARD
 PATTERN SIDE

IC1	B10	Q18	B7
IC4	C8	Q19	B7
IC5	C8	Q20	B7
IC7	C9	Q21	B7
IC8	B9	Q22	B7
IC9	B9	Q23	B8
IC10	C10	Q24	A10
IC20	B10	Q33	A8
IC21	B10	Q34	A9
Q1	A8	Q35	A8
Q2	B10	Q36	A9
Q3	B10	Q37	C8
Q4	B10	Q38	C10
Q6	A9	D2	A7
Q7	C8	D4	C9
Q8	C8	D5	A7
Q9	B8	A7	
Q10	C9	D7	B9
Q12	C10	D8	B9
Q13	C9		
Q17	B9		

DRIVE BOARD



(PATTERN SIDE)

	IC1	IC2	IC3	IC4	IC5	IC7	IC8	IC9	IC10	IC20	IC21	IC22
Pin1	2.9	4.8	0	0	9.4	-7.8	0	0	2.3	1.3	1.1	5.6
2	2.9	2.6	4.8	0.2	4.8	-7.5	4.4	4.5	2.3	1.3	1.1	0
3	0.5	2.6	0	0.3	4.8	0	4.5	4.5	2.3	0	0	5.0
4	2.9	4.8	4.8	0	0	-0.2	0	0.5	0.4			
5	5.4	1.2	0	4.8	1.9	4.8			2.3	4.8	4.8	
6		1.2	2.3	4.8	1.9	0.1			2.3			
7	0	0.4	5.0	4.2	4.8				4.1			
8	1.8	0.6	8.8	17.4	0				0			
9		0			0.1							
10		0			4.8							
11		2.0			4.6							
12		2.0	0									
13		0			14.6							
14		0			-7.4							
15		0			00.2							
16		0	0		0							
17		4.8										
18		4.8										
19		4.8										
20		4.8										

	IC6	IC6
Pin1	0	Pin33 4.7
2	2.0	34 4.8
3	0	35 1.8
4	0	36 2.4
5	0	37 0
6	4.8	38 0
7	0	39 1.5
8	0	40 0
9	0	41 1.1
10	0.7	42 8.5
11	0	43 0
12	0	44 0
13	0	45 1.1
14	0.5	46 1.4
15	0.1	47 0
16	0	48 4.8
17	0.4	49 0
18	0.1	50 0
19	2.4	51 0
20	2.4	52 0
21	0	53 0
22	4.8	54 4.8
23	0.1	55 0
24	0	56 0
25	4.8	57 0
26	0	58 0
27	4.8	59 0
28	4.6	60 0
29	4.6	61 0
30	0.1	62 0
31	4.8	63 0
32	4.8	64 0

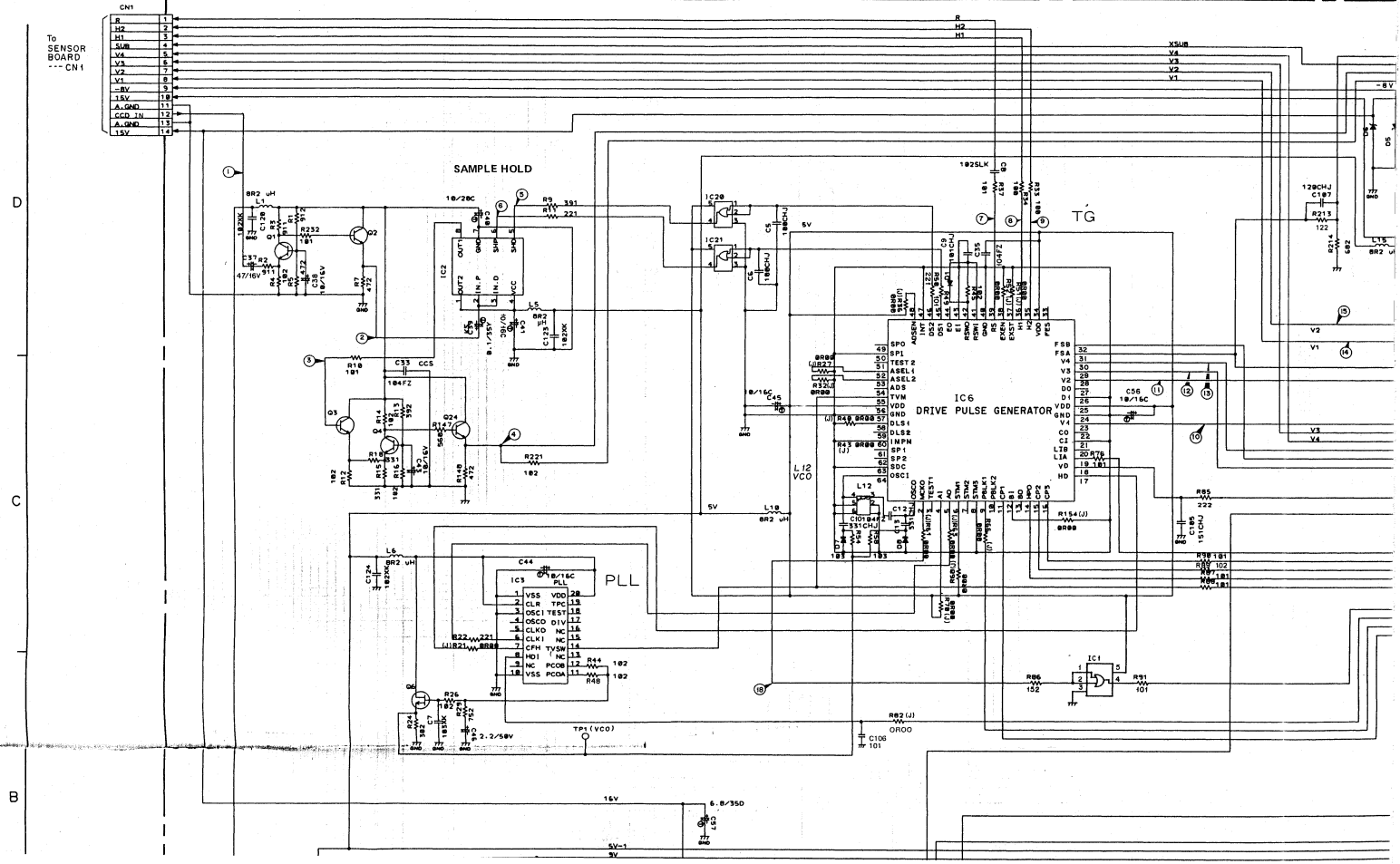
	B	C	E
Q1	3.0	6.9	2.2
2	8.6	8.7	7.9
3	1.7	8.7	1.4
4	1.7	5.4	1.05
5	2.3	2.0	4.8
6	4.3	4.5	5.0
7	6.7	10.6	6.2
8	10.0	9.1	10.1
9	15.2	16.6	14.6

	B	C	E
12	15.2	16.6	14.6
13	0.1	7.1	0
17	3.6	4.3	4.4
18	8.0	8.7	8.7
19	2.8	7.1	2.2
20	2.0	2.2	1.4
21	2.2	6.7	2.2
22	3.0	4.8	2.3
23	2.4	0	3.0

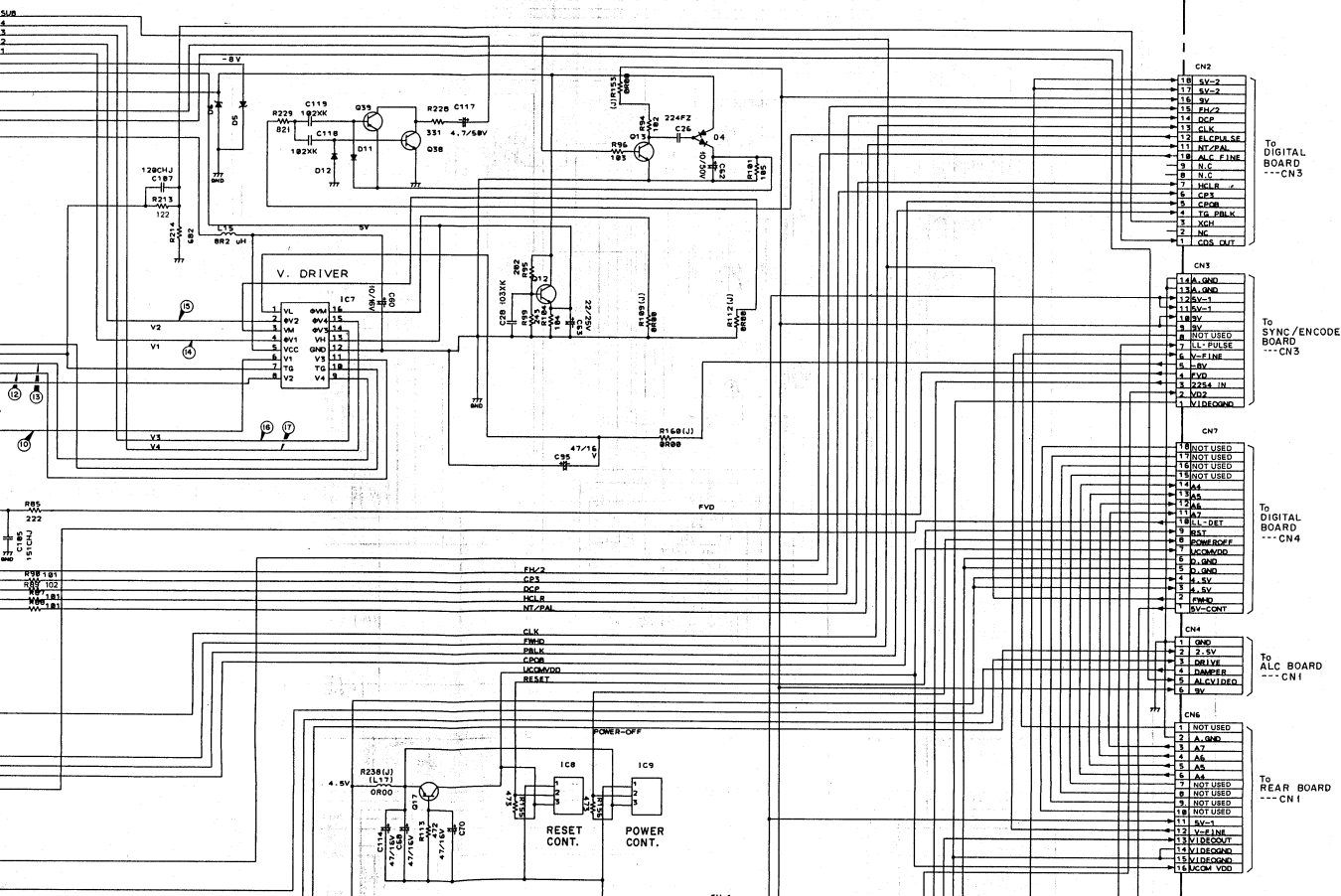
	B	C	E
24	5.4	8.7	4.7
33	6.7	2.2	7.3
34	6.7	2.2	7.3
35	1.6	0	2.2
37	4.9	5.0	5.6
38	0	12.7	0
39	23.4	-	24.0

SCHEMATIC DIAGRAM OF DRIVE BOARD FOR WV-C

DRIVE BOARD



VE BOARD FOR WV-CL320/WV-CL324



<Index> DRIVE BOARD

IC1	B4
IC2	D2
IC3	C2
IC4	A2
IC5	A3
IC6	C4
IC7	D5
IC8	B6
IC9	B6
IC10	A4
IC20	D3
IC21	B3
IC22	A2
Q1	D1
Q2	D2
Q3	C2
Q4	C2
Q6	B2
Q7	B2
Q8	A1
Q9	A1
Q10	B3
Q12	D6
Q13	D6
Q17	B6
Q18	B7
Q19	A6
Q20	A7
Q21	A7
Q22	A5
Q23	A5
Q24	C2
Q33	A6
Q34	A6
Q35	A6
Q37	A2
Q38	D5
Q39	D5
D1	D3
D2	A7
D4	D6
D5	D5
D6	D5
D7	C3
D8	C3
D11	D5
D12	D5

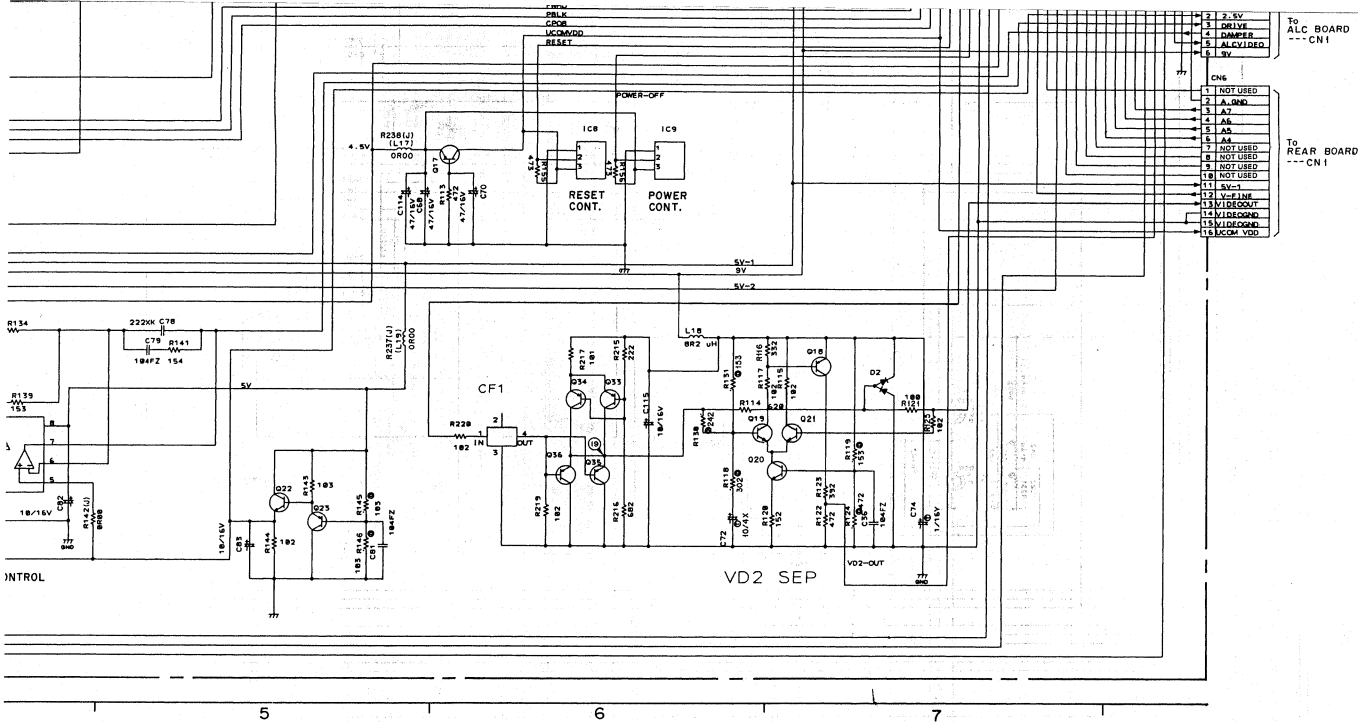
To DIGITAL BOARD
---CN3

To SYNC/ENCODE BOARD
---CN5

To DIGITAL BOARD
---CN4

To ALC BOARD
---CN1

To REAR BOARD
---CN1



SCHEMATIC DIAGRAM OF DRIVE BOARD

<Index>
DRIVE BOARD

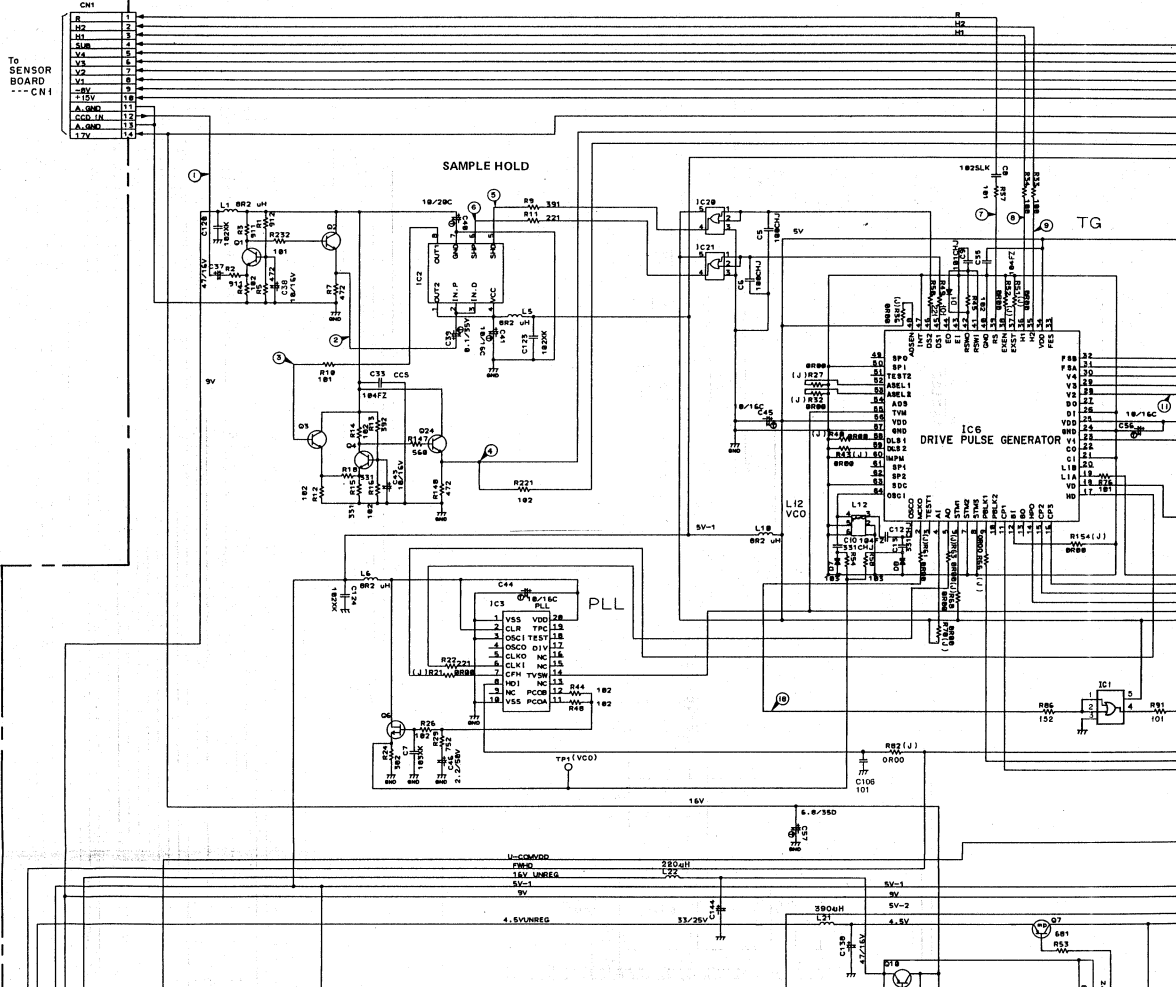
- IC1 C4
- IC2 B2
- IC3 C2,C3
- IC5 B4
- IC6 D4
- IC7 D5
- IC8 C6
- IC9 C7
- IC10 B5
- IC14 A3,B3
- IC20 D3
- IC21 D3
- Q1 D2
- Q2 D2
- Q3 D2
- Q4 D2
- Q6 C2
- Q7 B4
- Q10 B4
- Q12 D6
- Q13 E6
- Q17 C6
- Q18 B7
- Q19 B7
- Q20 B7
- Q21 B7
- Q22 B6
- Q23 B6
- Q24 D2
- Q27 B2
- Q30 A2
- Q33 B6
- Q34 B6
- Q35 B6
- Q36 B6
- Q38 E6
- Q39 E6
- D1 D4
- D2 D7
- D4 E7
- D5 E5
- D6 E5
- D7 C3
- D8 C4
- D11 E5
- D12 E5

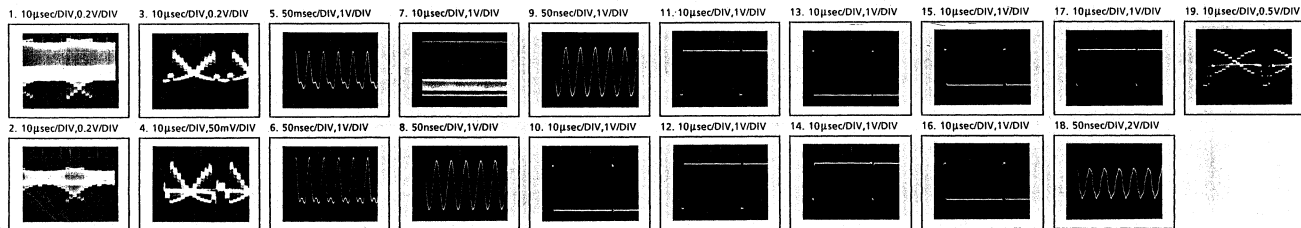
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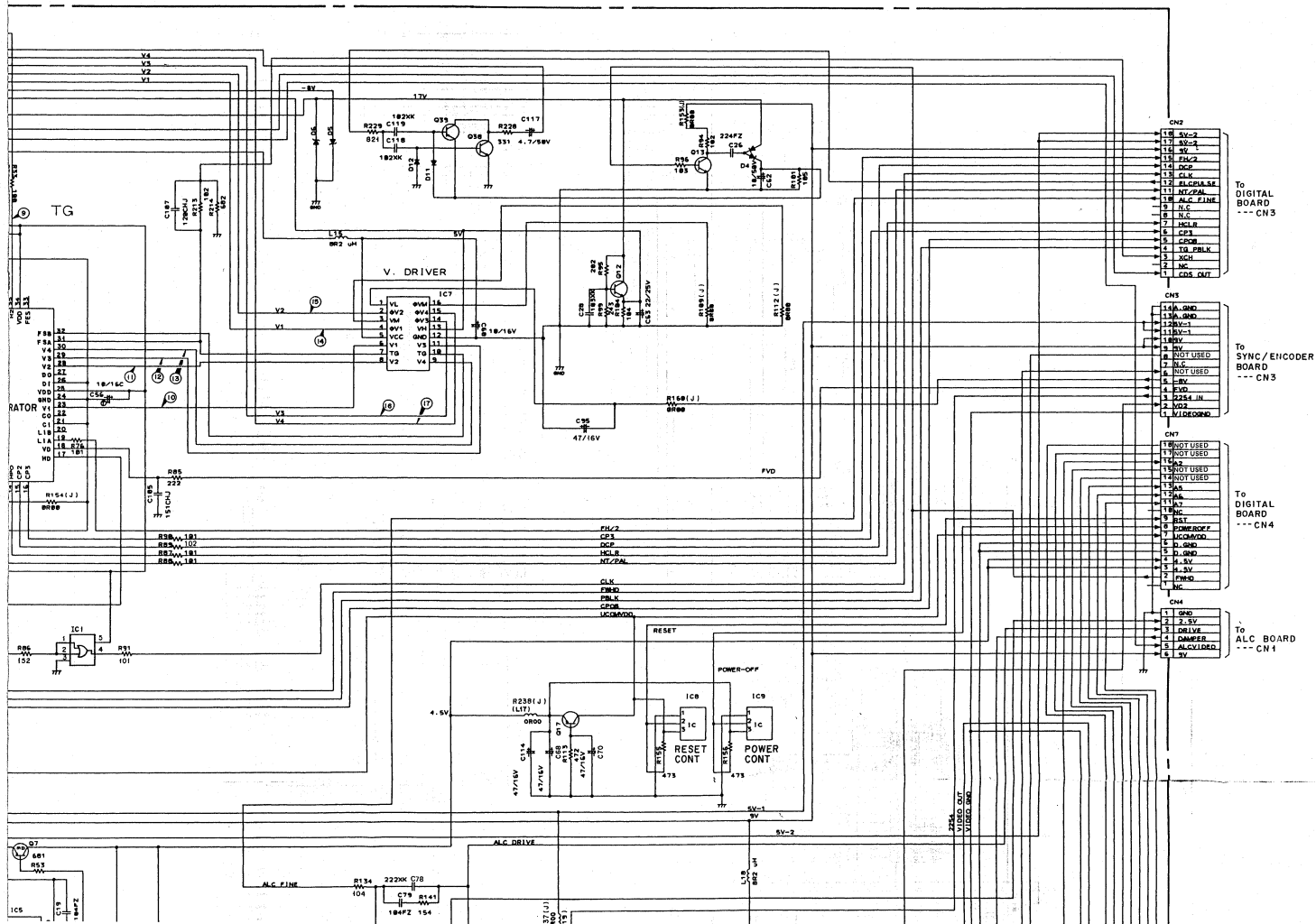
D

C

DRIVE BOARD







	IC1	IC2	IC3	IC5	IC7	IC8	IC9	IC10	IC14	IC20	IC21
Pin 1	2.9	4.8	0	9.4	-7.8	0	0	2.3	0	1.3	1.1
2	2.9	2.6	4.8	4.8	-7.5	4.4	4.5	2.3	0.2	1.3	1.1
3	0.5	2.6	0	4.8	0	4.5	4.5	2.3	0.3	0	0
4	2.9	4.8	4.8	0	-0.2			0	0	0.5	0.4
5	5.4	1.2	0	1.9	4.8			2.3	4.8	4.8	4.8
6		1.2	2.3	1.9	0.1			2.3	4.8		
7		0	0.4	4.2	4.8			4.1	5.0		
8		1.8	0.6	17.4	0			0	8.8		
9			0		0.1						
10			0		4.8						
11			2.0		4.6						
12			2.0		0						
13			0		14.6						
14			0		-7.4						
15			0		00.2						
16			0		0						
17			4.8								
18			4.8								
19			4.8								
20			4.8								

	IC6	IC6
Pin 1	0	Pin 33 4.7
2	2.0	34 4.8
3	0	35 1.8
4	0	36 2.4
5	0	37 0
6	4.8	38 0
7	0	39 1.5
8	0	40 0
9	0	41 1.1
10	0.7	42 8.5
11	0	43 0
12	0	44 0
13	0	45 1.1
14	0.5	46 1.4
15	0.1	47 0
16	0	48 4.8
17	0.4	49 0
18	0.1	50 0
19	2.4	51 0
20	2.4	52 0
21	0	53 0
22	4.8	54 4.8
23	0.1	55 0
24	0	56 0
25	4.8	57 0
26	0	58 0
27	4.8	59 0
28	4.6	60 0
29	4.6	61 0
30	0.1	62 0
31	4.8	63 0
32	4.8	64 0

	B	C	E
Q1	3.0	6.9	2.2
2	8.6	8.7	7.9
3	1.7	8.7	1.4
4	1.7	5.4	1.05
6	2.3	2.0	4.8
7	4.3	4.5	5.0
10	15.2	16.6	14.6
12	15.2	16.6	14.6

	B	C	E
13	0.1	7.1	0
17	3.6	4.3	4.4
18	8.0	8.7	8.7
19	2.8	7.1	2.2
20	2.0	2.2	1.4
21	2.2	8.7	2.2
22	3.0	4.8	2.3
23	2.4	0	3.0

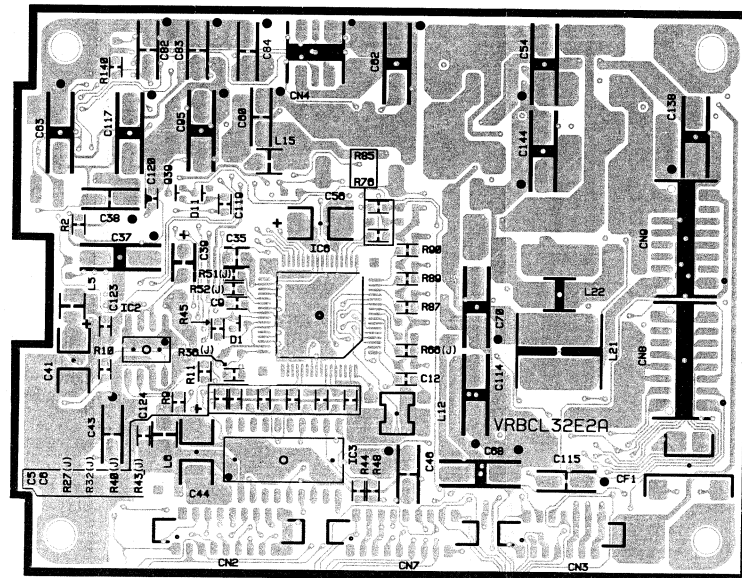
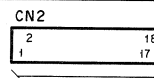
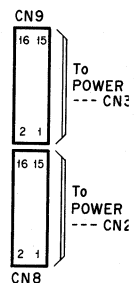
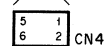
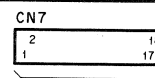
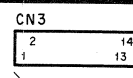
	B	C	E
24	5.4	8.7	4.7
27	4.8	8.7	5.0
30	4.6	0	5.0
33	6.7	2.2	7.3
34	6.7	2.2	7.3
35	1.6	0	2.2
36	1.6	0	2.2
38	0	12.7	0
39	23.4	-	24.0

DRIVE BOARD

C

B

A

To
ALC BOARD
--- CN1To
DIGITAL BOARD
--- CN3To
DIGITAL BOARD
--- CN4To
SYNC/ENCODER BOARD
--- CN3

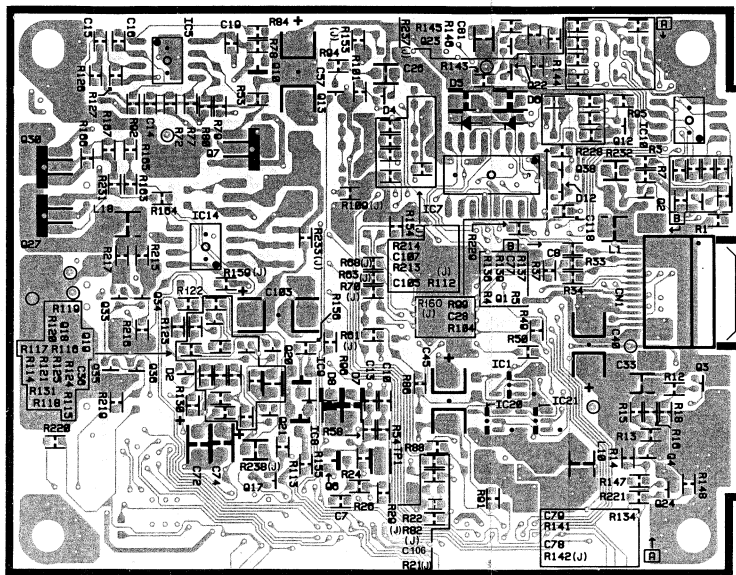
(COMPONENT SIDE)

1

2

3

DRIVE BOARD



To
SENSOR BOARD
--- CN1

(PATTERN SIDE)

<Index>

DRIVE BOARD

IC1	B5
IC2	B1
IC3	A1,A2
IC5	C4
IC6	B2
IC7	B5
IC8	A4
IC9	B4
IC10	B6
IC14	B4
IC20	A5
IC21	A5
Q1	B5
Q2	B6
Q3	A6
Q4	A5
Q6	A4
Q7	B4
Q10	C4
Q12	B5
Q13	C4
Q17	A4
Q18	B4
Q19	B4
Q20	B4
Q21	A4
Q22	C5
Q23	C5
Q24	A6
Q27	B4
Q30	B4
Q33	B5
Q34	B5
Q35	B5
Q38	C6
Q39	C1
D1	B1
D2	B5
D4	C6
D5	C6
D6	C6
D7	B5
D8	B5
D11	B1
D12	B6

(PATTERN SIDE)

4

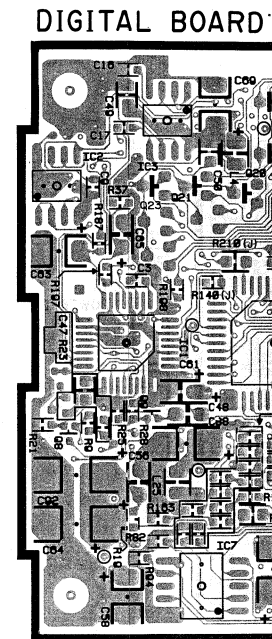
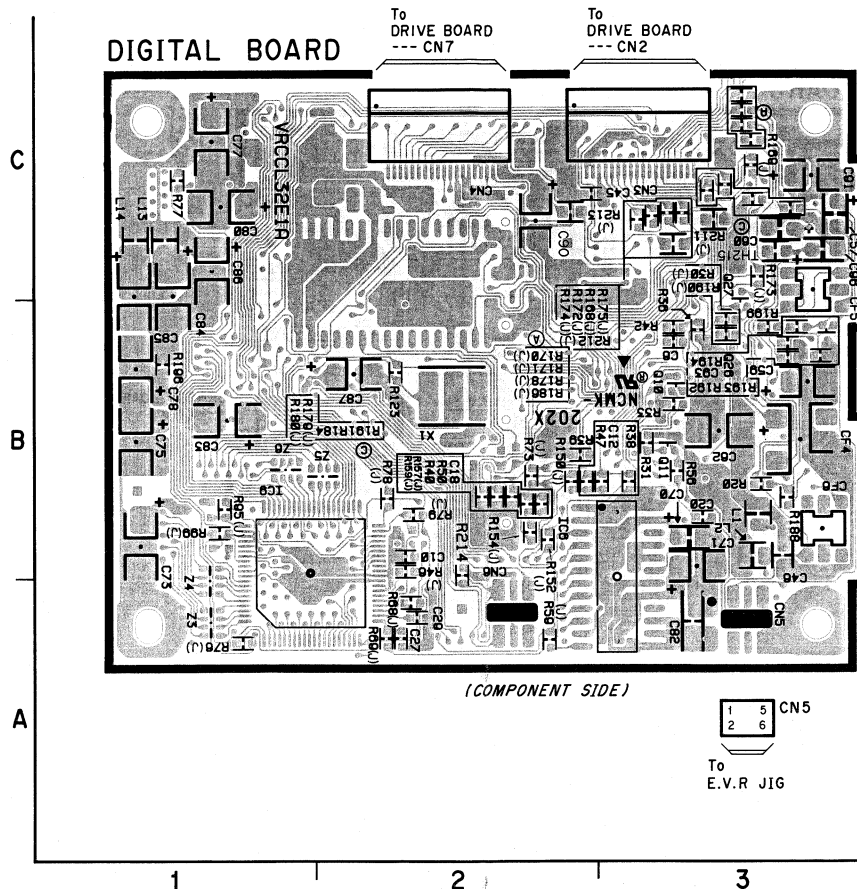
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6

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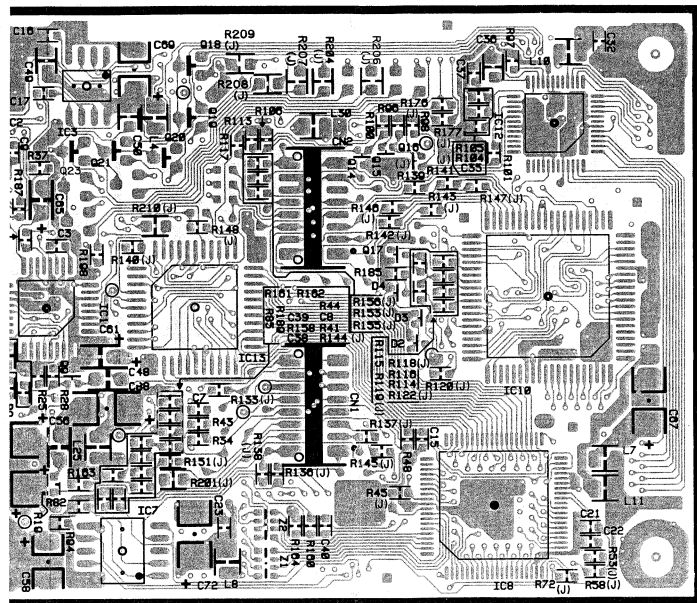
DIGITAL BOARD

IC1	B5
IC2	B4
IC3	A2
IC6	A4
IC7	A5
IC8	A6
IC9	A1
IC10	B6
IC12	B6
IC13	B5
Q8	B4
Q9	B5
Q10	B3
Q11	B3
Q14	B5
Q15	B6
Q16	B6
Q17	B6
Q18	C5
Q19	B5
Q20	B5
Q21	(WV-CL320/WV-CL324 ONLY)
Q23	C4 (WV-CL322 ONLY)
Q26	B3
Q27	B3
D2	B6
D3	B6
D4	B6



OF DIGITAL BOARD

TAL BOARD



(PATTERN SIDE)

16 15
2 1
CN2
To
SYNC/ENCODER
BOARD
--- CN2

16 15
2 1
CN1
To
SYNC/ENCODER
BOARD
--- CN1

	IC8	IC9	IC10
Pin1	0.3	2.1	2.4
2	0.8	0	2.4
3	2.8	0	2.4
4	1.0	1.8	2.4
5	0.9	1.5	2.4
6	0.8	1.5	2.8
7	1.2	0	2.7
8	1.5	2.5	3.8
9	1.2	3.4	2.4
10	0.2	0	3.6
11	1.2	0.2	3.1
12	2.1	1.2	3.1
13	1.8	1.4	3.0
14	1.3	1.1	2.8
15	1.4	1.2	0.0
16	1.4	1.8	4.3
17	1.8	2.1	3.9
18	0	3.0	4.1
19	0	0	3.4
20	2.1	0.3	1.1
21	0	0.1	3.1
22	4.3	0.5	3.1
23	0.4	2.1	4.3
24	2.4	0	0.0
25	1.3	0.8	0.1
26	1.5	1.0	4.8
27	1.7	0	2.1
28	1.6	0	4.3
29	1.5	4.3	1.7
30	1.5	0	1.9
31	1.6	0	0.0
32	0.4	0	0.0
33	0	4.3	0
34	0	4.3	0
35	0	4.1	4.3
36	0	4.2	0
37	0	4.2	4.3
38	0	4.2	4.3
39	0	0.4	4.3
40	0	0	0

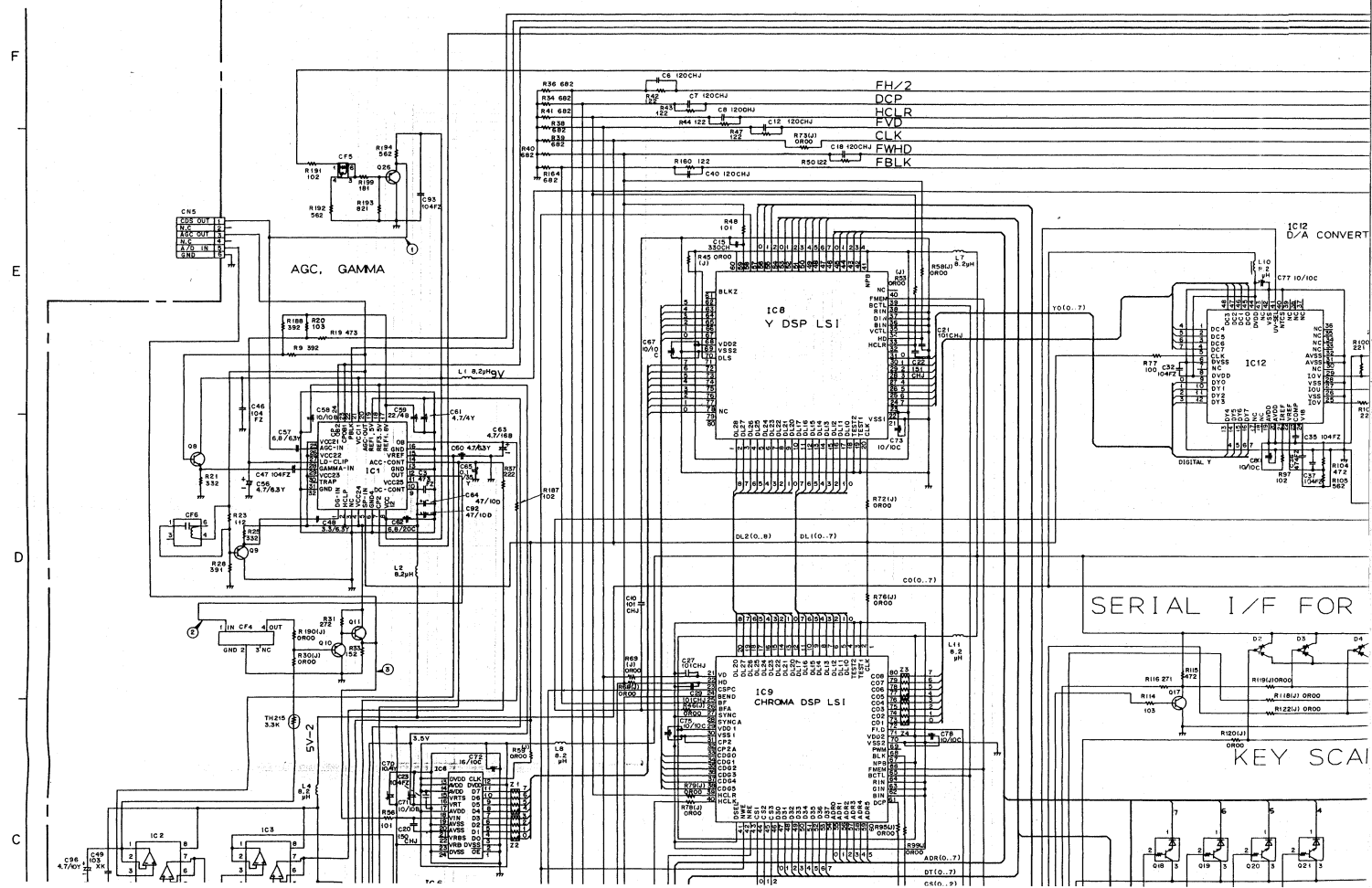
	IC8	IC9	IC10
Pin41	4.3	0	0
42	3.7	4.2	0
43	3.0	4.0	4.2
44	3.1	2.8	4.3
45	3.0	2.8	4.3
46	2.7	2.8	4.3
47	0.5	1.6	0
48	0.6	0.6	0
49	0.7	1.0	4.3
50	0.8	1.0	0
51	1.0	0.1	0
52	1.1	0.4	4.3
53	0.9	0.2	4.3
54	1.8	0.4	0
55	2.4	2.7	3.2
56	2.8	2.9	0
57	2.4	3.2	0
58	4.1	3.3	1.6
59	0.5	3.8	1.6
60	0	2.8	2.3
61	0.6	0	1.7
62	0	0	2.7
63	4.2	0	0
64	4.2	0	0
65	4.1	0	0
66	4.1	0	0
67	4.3	4.3	3.7
68	4.3	0.5	4.3
69	4.3	0	4.3
70	0	0	0.5
71	4.3	4.3	0.7
72	0	2.1	0.8
73	1.8	1.2	0.9
74	1.5	1.3	1.0
75	2.2	1.4	1.2
76	1.5	1.5	1.0
77	1.6	1.5	1.8
78	1.8	1.5	0
79	0	0	2.4
80	0	1.4	2.3

	IC2	IC3	IC7
Pin1	1.7	2.2	4.2
2	4.8	0	0
3	1.7	2.2	0
4	0	0	4.3
5	1.7	3.1	4.3
6	1.7	3.1	0
7	1.7	3.1	0
8	4.8	4.8	0
9		4.3	
10		4.3	

	B	C	E
Q8	1.9	8.7	1.36
9	0.5	0	1.1
10	1.9	0	2.5
11	2.5	4.8	1.8
14	4.2	4.8	3.6
15	4.5	4.7	3.9
16	4.2	4.8	0
17	0	4.4	0
18	0	4.3	0
19	0	4.3	3.8
20	0	4.3	2.4
21	0	4.3	3.6
23	0	4.3	3.1
26	1.7	0	2.3
27	0	3.1	1.6

	IC1	IC6	IC12	IC13
Pin1	1.9	0	1.4	0
2	4.8	0	0	0
3	0	0	0	4.1
4	4.8	1.6	1.4	0
5	2.1	1.6	2.1	2.1
6	0	1.7	0	2.0
7	0	2.2	0	4.2
8	8.7	1.9	4.8	3.7
9	3.1	0	1.3	0.5
10	4.8	0	1.3	0.1
11	2.0	4.3	1.3	4.1
12	0	2.1	1.3	0
13	2.5	4.3	1.3	0
14	1.7	4.3	0	0
15	0	4.3	1.9	0
16	1.9	4.3	0	0
17	3.7	3.7	0	4.3
18	1.6	4.3	0	0
19	1.9	1.8	0.7	2.8
20	8.7	0	0	3.0
21	0.9	0	2.7	3.1
22	0	0	2.6	3.0
23	0	1.6	2.8	2.4
24	4.8	0	1.5	2.4
25	1.9	3.8	2.4	
26	4.8	0	1.8	
27	1.9	4.2	1.0	
28	0	0	1.1	
29	0	4.2	1.0	
30	4.8	0	0.8	
31	1.9	0	0.8	
32	0	0	0.5	
33	0	0	0.5	
34	0	0	0	
35	0	0	4.3	
36	0	0	0.5	
37	0	0	0.1	
38	0	0	0	
39	0	0	0	
40	0	0	4.3	
41	0	0	4.3	
42	0	0	4.3	
43	0	0	0	
44	4.8	4.3	0	
45	0	0	0	
46	1.6	0	0	
47	1.8	0	0	
48	2.0	0	0	

DIGITAL BOARD





IC12
D/A CONVERTER (FOR DSP)

IC13
KEY SCANNER

STOP
PLAY
PAUSE
REWIND
F.WIND
EJECT
STOP/PAUSE
PLAY/PAUSE
REWIND/PAUSE
F.WIND/PAUSE

16 PIN CONNECTOR (CN1)

1 SDATA
2 SCLK
3 D/A-CS
4 LOWCLIP
5 RBLK
6 VD
7 FBLK
8 CP2
9 FWHI
10 FVD
11 B-DET
12 GND
13 R-DET
14 GND
15 LDET
16 NT/PAL

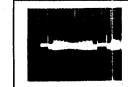
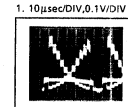
16 PIN CONNECTOR (CN2)

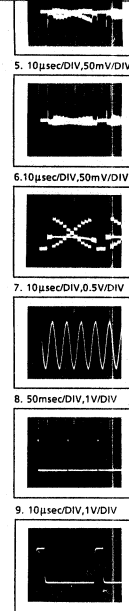
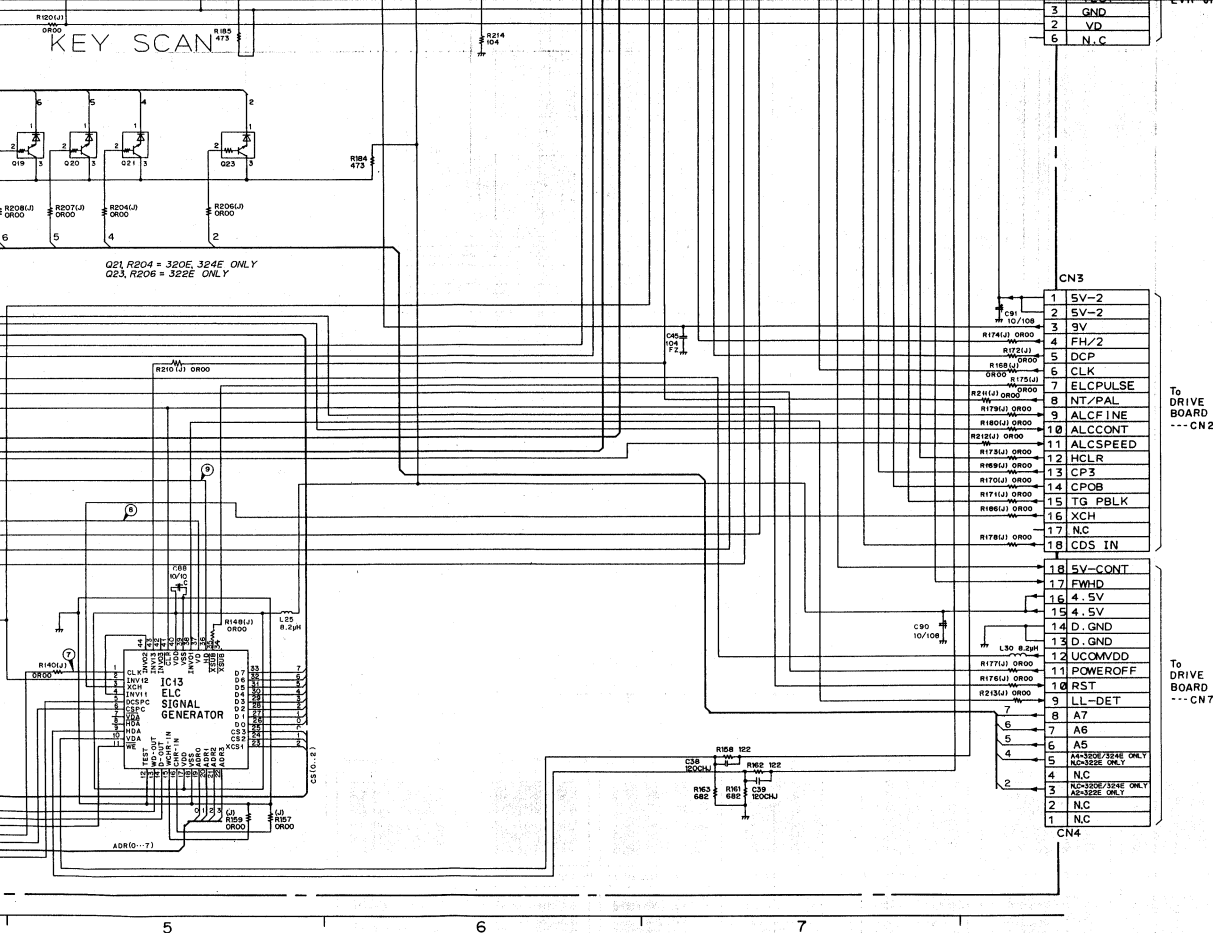
1 PS0
2 PS1
3 PS2
4 PS3
5 SPC0
6 SPC1
7 SV-CONT
8 NC
9 NC
10 NC
11 NC
12 ENC-5V
13 YH
14 ENC-5V
15 B-Y
16 R-Y

16 PIN CONNECTOR (CN6)

5 SIO
4 SCK
1 TEST
3 GND
2 VD
6 N.C

IC1	D2
IC2	C1
IC3	C1
IC6	C2
IC7	B2
IC8	E3
IC9	C3
IC10	B3
IC12	E5
IC13	A5
Q8	D1
Q9	D1
Q10	D2
Q11	D2
Q14	E5
Q15	E5
Q16	D5
Q17	C4
Q18	C4
Q19	C5
Q20	C5
Q21	C5
(VV-CL320/VV-CL324 ONLY)	
Q23	C5
(VV-CL322 ONLY)	
Q26	E2
Q27	B2
D2	D5
D3	D5
D4	D5





To
DRIVE
BOARD
--- CN2

To
DRIVE
BOARD
--- CN7

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SYNC/ENCODER BOARD

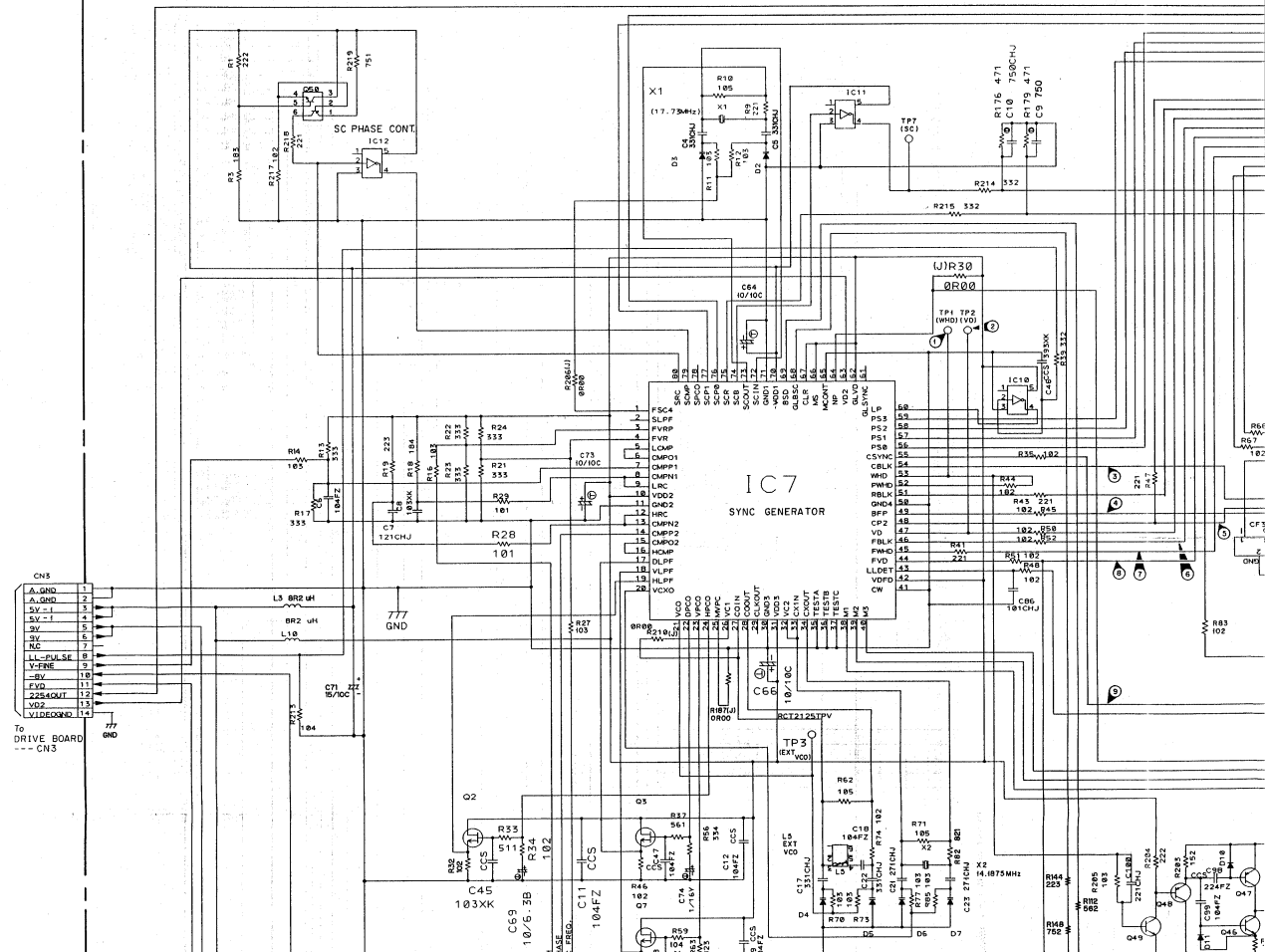
SYNC/ENCODER BOARD

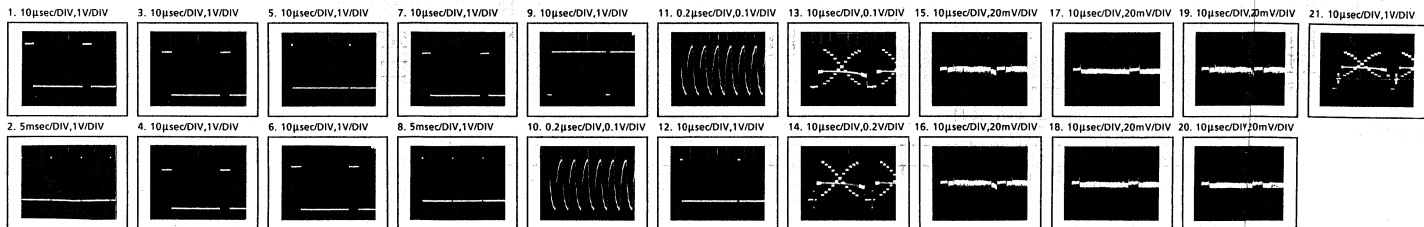
IC4 C5,C6
 IC5 B6
 IC7 C3,D3
 IC8 B7
 IC9 B5
 IC10 D4
 IC11 3E
 IC12 2E
 Q2 B2
 Q3 B3
 Q7 B3
 Q10 D6
 Q11 C5
 Q29 A2
 Q45 A6
 Q46 B4
 Q47 B4
 Q48 B4
 Q49 B4
 Q50 E2
 D1 B5
 D2 D3
 D3 D3
 D4 B3
 D5 B3
 D6 B4
 D8 B5
 D9 B5
 D10 B4
 D11 B4

E

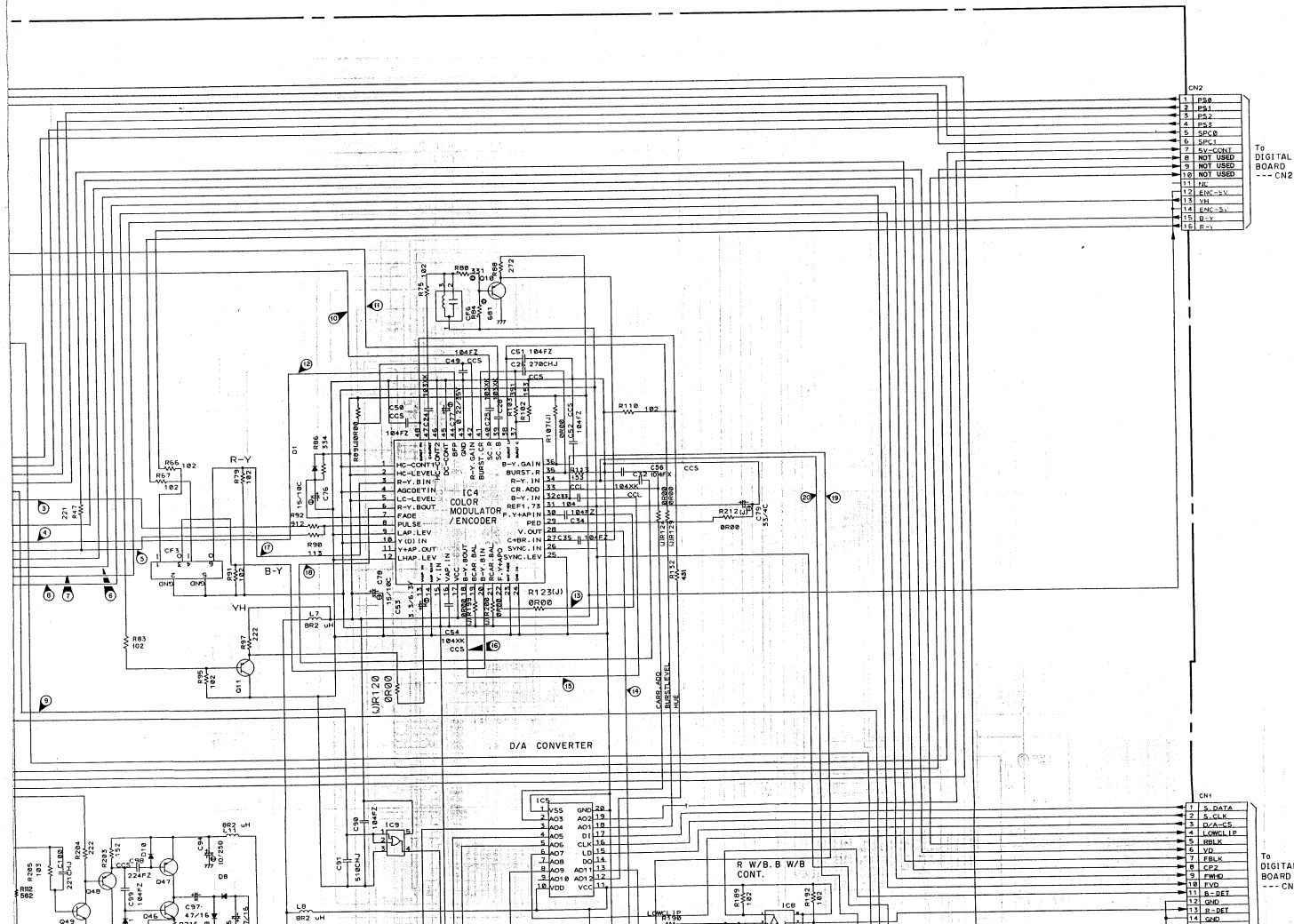
D

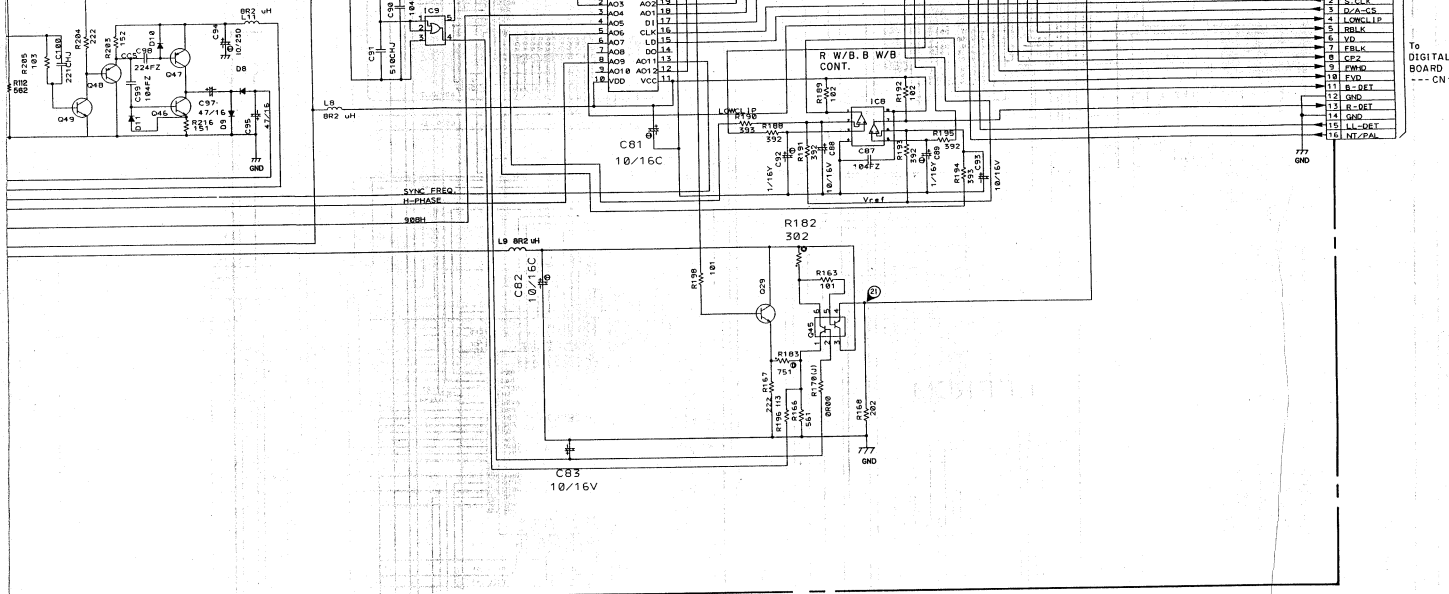
C





AM OF SYNC/ENCODER BOARD





4 5 6 7 8

1sec/DIV, 1V/DIV

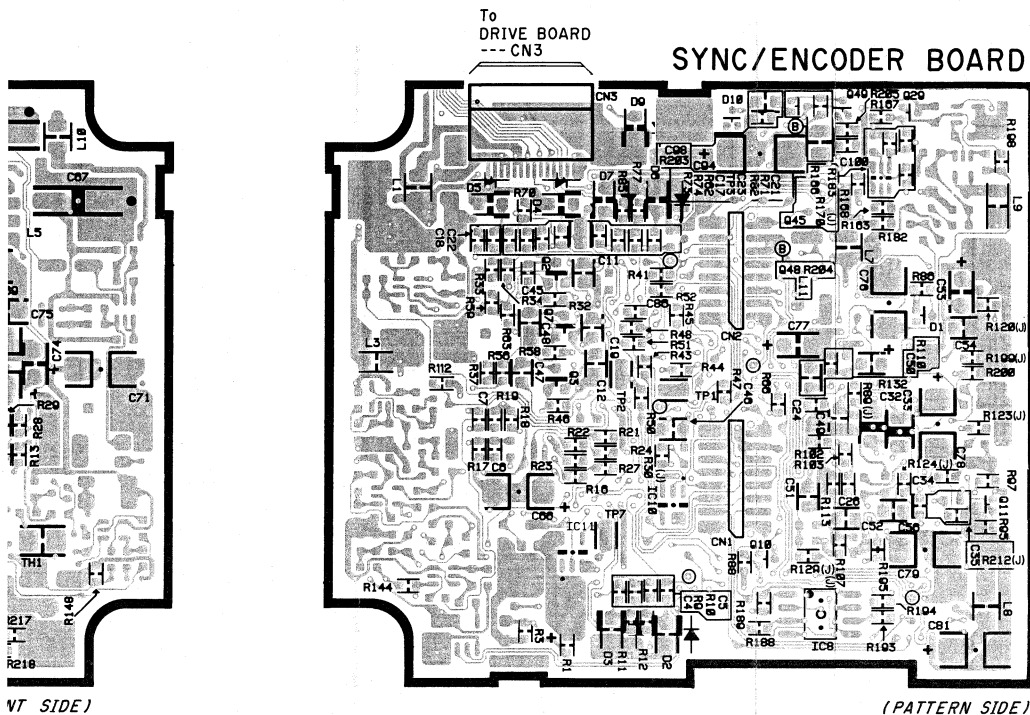


	B	C	E
Q2	4.7	4.8	4.8
3	5.2	5.5	5.5
7	0.3	0	4.8
10	1.7	0	2.3
11	0	0	2.5
29	0	8.7	1.2
46	0.8	1.7	0.3
47	9.2	1.7	8.7
48	4.1	0	2.3
49	0	4.1	0

	Pin 1	2	3	4	5	6
Q45	1.1	1.7	8.7	0	3.1	3.1
Q50	4.8	4.2	4.8	4.2	4.8	0

	IC1	IC5	IC8	IC9	IC10	IC11	IC12
Pin1	0	0	0.1	4.4	0	0	0
2	0	0.9	1.7	4.4	0	0	0
3	0	1.4	1.7	0	0	0	0.6
4	1.0	1.7	0	4.3	4.8	5.0	2.9
5	0	1.7	0	4.8	4.8	0	5.5
6	0	2.2	1.7				
7	0	0.6	0.1				
8	0	0	4.8				
9	0	0					
10	0	3.8					
11	4.8	4.8					
12	0	1.6					
13	0	0.9					
14	0	1.8					
15	0						
16	3.3						
17	4.3						
18	2.4						
Pin1	0						
20	0						

VIEW OF SYNC/ENCODER BOARD



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SYNC/ENCODER BOARD

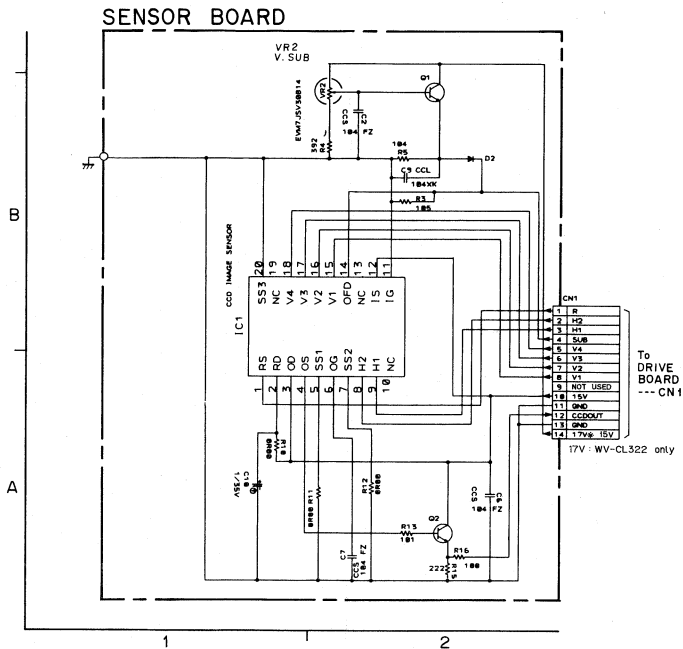
IC4	B1
IC5	A1
IC7	B2
IC8	A5
IC9	A2
IC10	A5
IC11	A4
IC12	A2
Q2	B4
Q3	B4
Q7	B4
Q10	A5
Q11	A6
Q29	C6
Q45	B5
Q46	C2
Q47	C2
Q48	B5
Q49	C5
Q50	A2
D1	B5
D2	A5
D3	A5
D4	B4
D5	B4
D6	B5
D7	B5
D8	C2
D9	C5
D10	C5
D11	C2

SCHEMATIC DIAGRAM OF SENSOR BOARD

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SENSOR BOARD

Q1 B2
Q2 A2
D2 B2

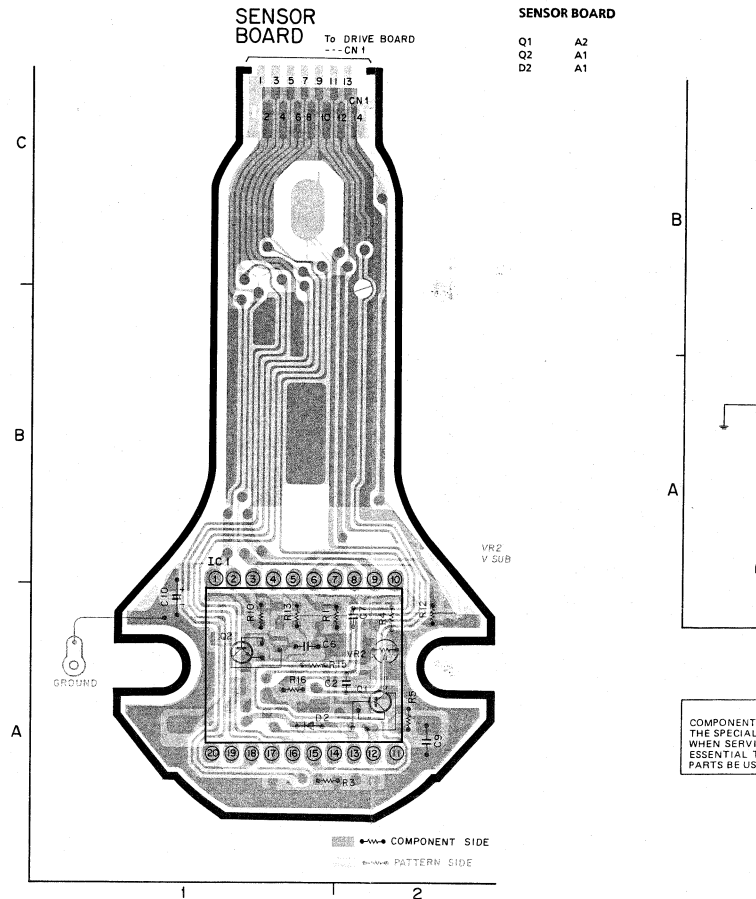


CONDUCTOR VIEW OF SENSOR BOARD

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SENSOR BOARD

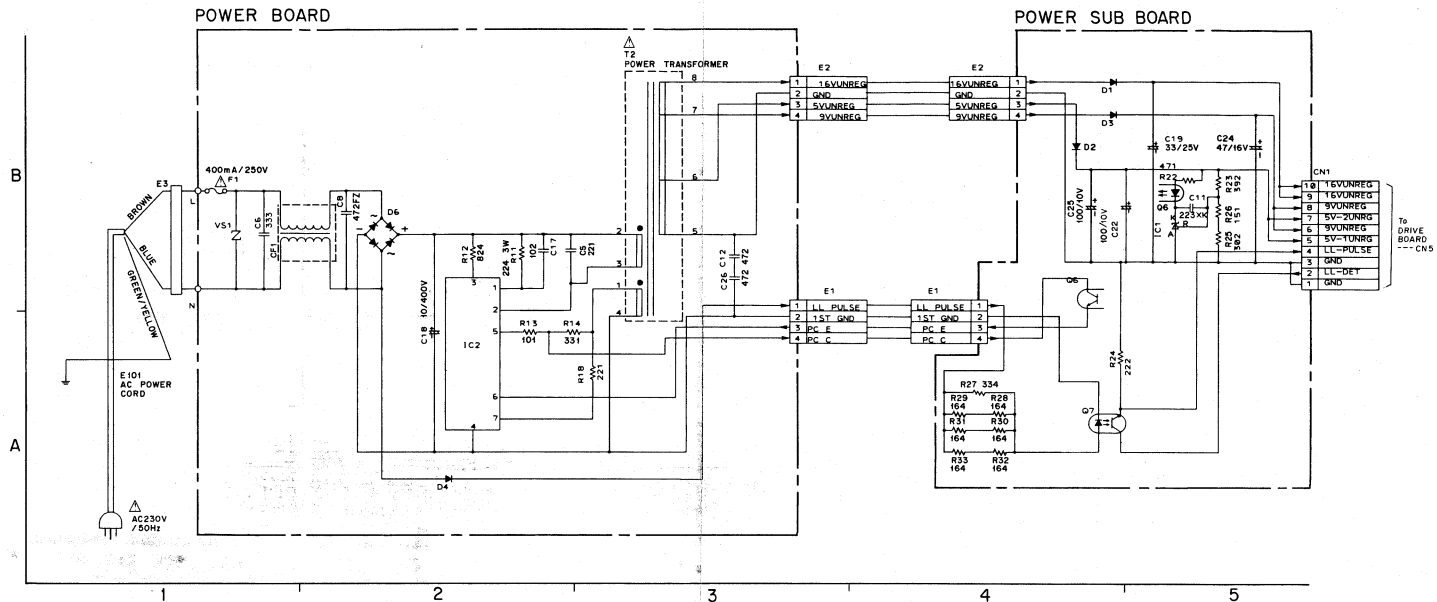
Q1 A2
Q2 A1
D2 A1



◆---◆ COMPONENT SIDE
--- PATTERN SIDE

COMPONENT
THE SPECIAL
WHEN SERV
ESSENTIAL 1
PARTS BE US

SCHEMATIC DIAGRAM OF POWER BOARD FOR WV-CL320



PRODUCT SAFETY NOTICE

COMPONENT IDENTIFIED WITH THE "A" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURE'S SPECIFIED PARTS BE USED.

(VOLTAGES)
POWER BOARD

Pin	IC1
1	1.0
2	136.0
3	0.1
4	-0.2
5	-0.2
6	-0.2
7	-0.2

(VOLTAGES)
POWER SUB BOARD

Pin	IC1
1	8.8
2	0
3	2.5

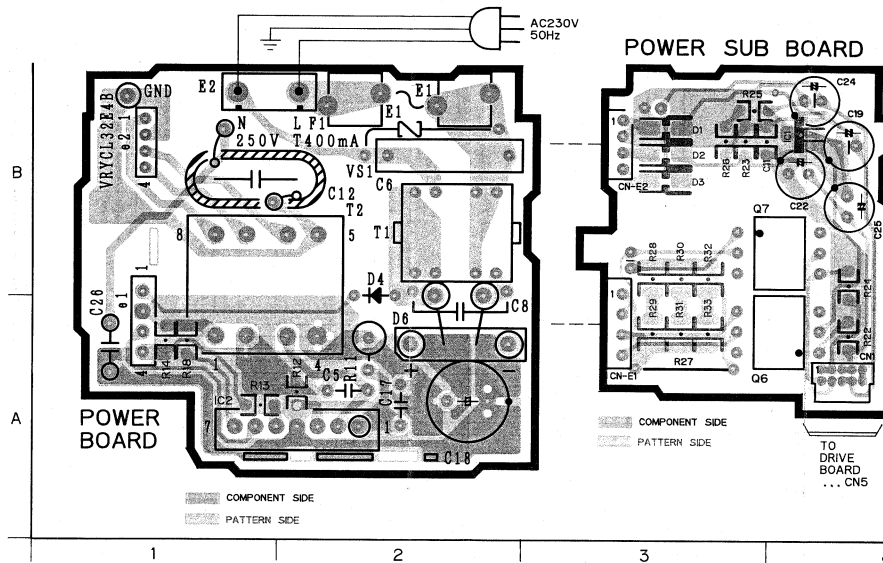
<Index>
POWER BOARD

IC2	A2
D4	A2
D6	B2

POWER SUB BOARD

IC1	B5
Q6	B4
Q7	A4
D1	B4
D2	B4
D3	B4

CONDUCTOR VIEW OF POWER BOARD FOR WV-CL320



<Index>
POWER BOARD
IC2 A1,A2
D4 A2
D6 A2

POWER SUB BOARD
IC1 B4
Q6 A4
Q7 B4
D1 B3
D2 B3
D3 B3

SCHEMATIC DIAGRAM OF POWER BOARD FOR WV-CL322

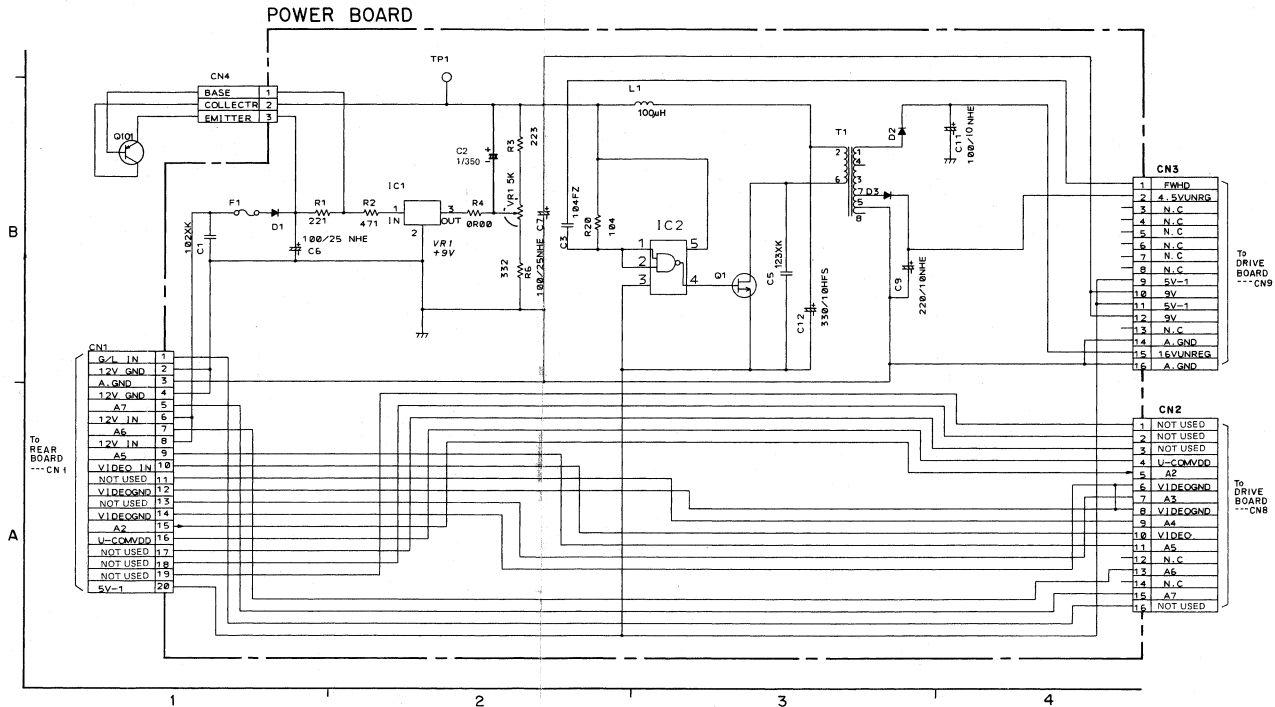
(VOLTAGES)

	IC1	IC2
Pin 1	8.2	5.7
2	0	5.7
3	1.2	4.9
4		8.2
5		8.8

	B	C	E
Q1	68.2	8.4	5.4.9
Q101	10.3	0	11.4

<Index>
POWER BOARD

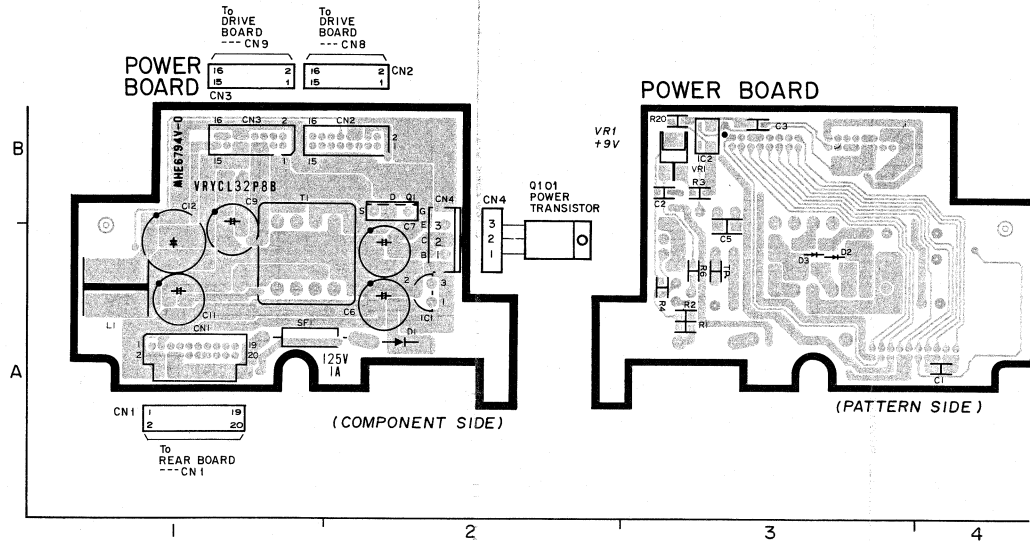
IC1	B2
IC2	B3
Q1	B3
Q101	B1
D1	B1
D2	B3
D3	B3



CONDUCTOR VIEW OF POWER BOARD FOR WV-CL322

<Index> POWER BOARD

IC1	A2
IC2	B3
Q1	B2
Q101	A2
D1	A2
D2	A3
D3	A3



SCHEMATIC DIAGRAM OF POWER BOARD FOR WV-CL324

(VOLTAGES)

	IC1
Pin 1	8.8
2	0
3	2.5

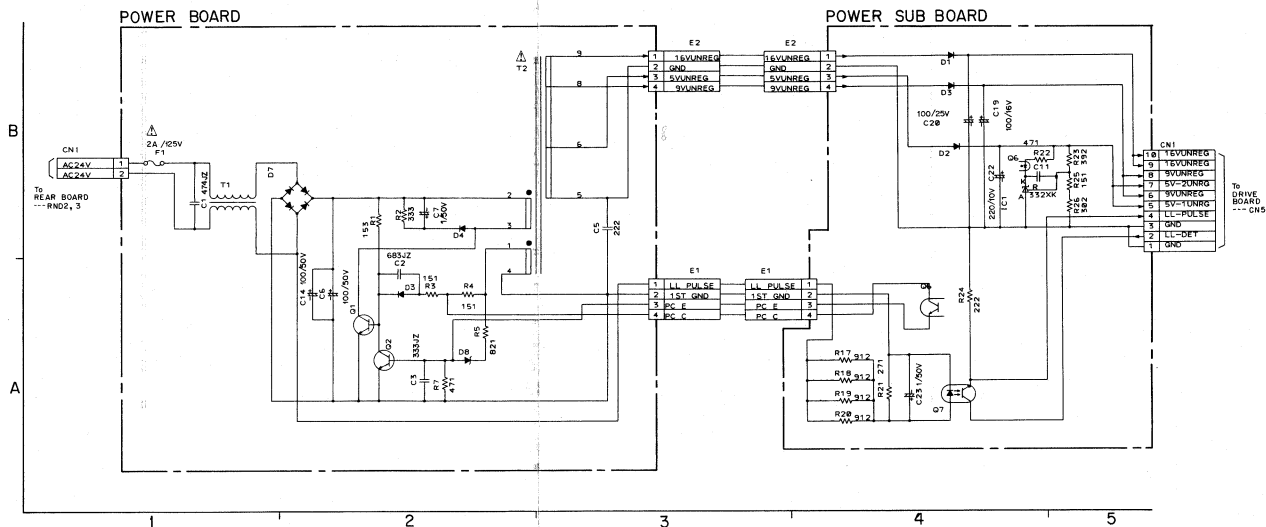
<Index>

POWER BOARD

Q1 A2
Q2 A2
D3 A2
D4 B2
D7 B2
D8 A2

POWER SUB BOARD

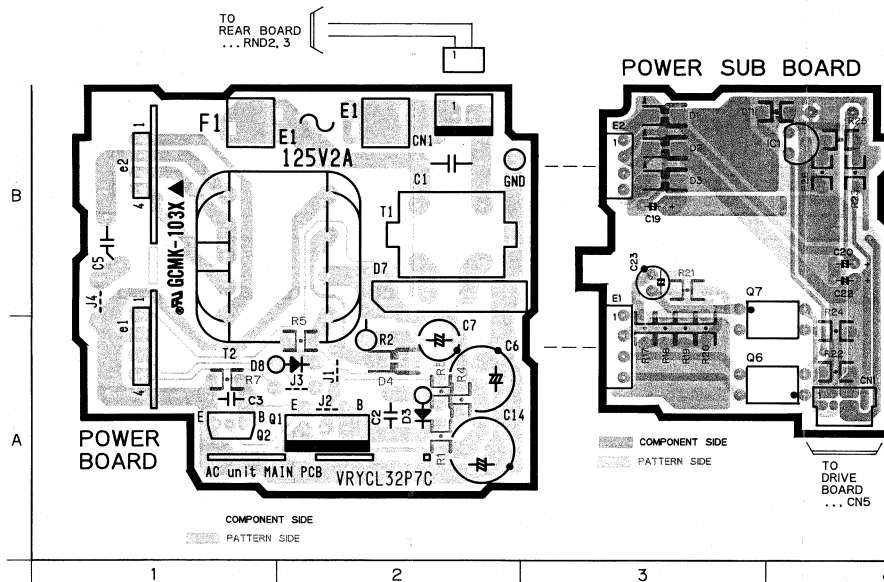
IC1 B4
Q6 A4,B4
Q7 A4
D1 B4
D2 B4
D3 B4



PRODUCT SAFETY NOTICE

COMPONENT IDENTIFIED WITH THE "A" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURE'S SPECIFIED PARTS BE USED.

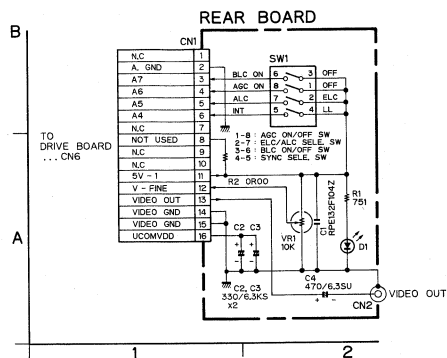
CONDUCTOR VIEW OF POWER BOARD FOR WV-CL324



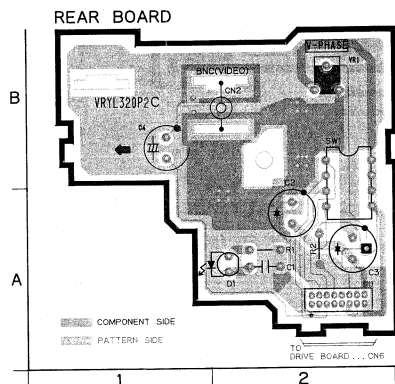
<Index>
POWER BOARD
Q1 A2
Q2 A1
D3 A2
D4 A2
D7 B2
D8 A2

POWER SUB BOARD
IC1 B4
Q6 A3,A4
Q7 A3,A4
D1 B3
D2 B3
D3 B3

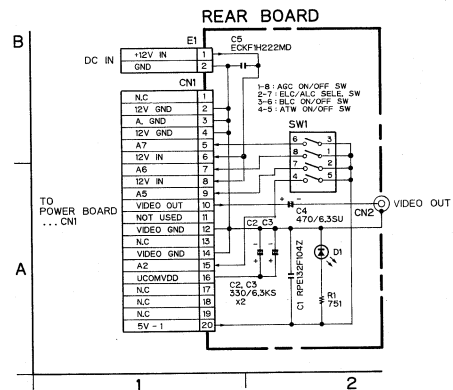
SCHEMATIC DIAGRAM OF REAR BOARD FOR WV-CL320



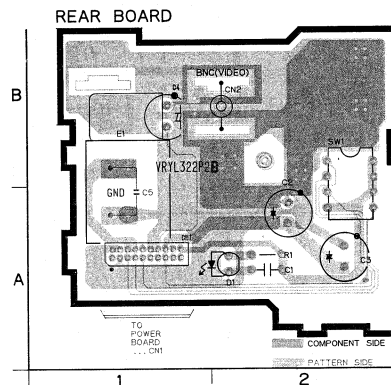
CONDUCTOR VIEW OF REAR BOARD FOR WV-CL320



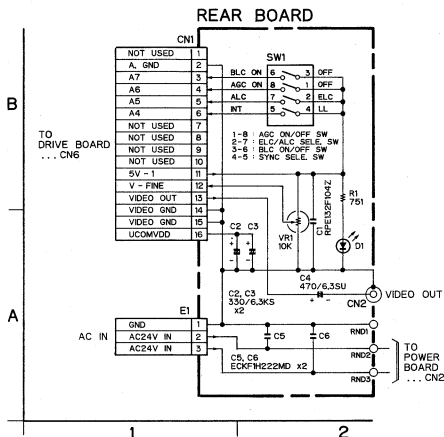
SCHEMATIC DIAGRAM OF REAR BOARD FOR WV-CL322



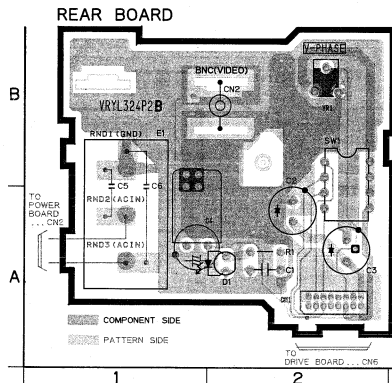
CONDUCTOR VIEW OF REAR BOARD FOR WV-CL322



SCHEMATIC DIAGRAM OF REAR BOARD FOR WV-CL324



CONDUCTOR VIEW OF REAR BOARD FOR WV-CL324



The schematic diagram illustrates the lens drive circuit for a color monitor. It features a lens drive unit (CN2) with pins 1-4, a drive board (CN1) with pins 1-6, and a lens selection switch (SW1) with 12 positions. Inductors L1-L4 are 0.68μH, and capacitors C3-C5 are 102KX and C6 is 104FZ. The circuit is connected to a +9V supply and ground.

Component Labels:

- Inductors:** L1 0.68μ, L2 0.68μ, L3 0.68μ, L4 0.68μ
- Capacitors:** C3 102 KX, C4 102 KX, C5 102 KX, C6 104FZ
- Switch:** SW1 LENS SELECTION SWITCH
- Connectors:** CN1, CN2

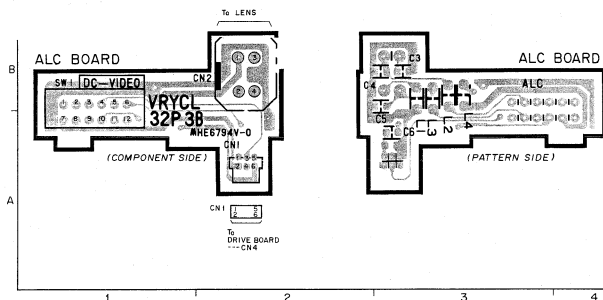
Pin Connections:

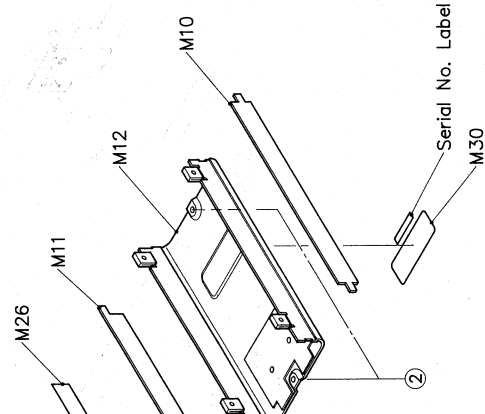
- CN2:**
 - Pin 1: DUMPER/NC
 - Pin 2: 2.5V/9V
 - Pin 3: DRIVE /ALC VIDEO
 - Pin 4: GND
- CN1:**
 - Pin 1: GND
 - Pin 2: +2.5V
 - Pin 3: DRIVE
 - Pin 4: DUMPER
 - Pin 5: ALC VIDEO
 - Pin 6: +9V
- SW1:** 12 positions, labeled 1 through 12.

Wiring Details:

- Inductor L1 is connected between CN1 Pin 2 and CN2 Pin 3.
- Inductor L2 is connected between CN1 Pin 3 and CN2 Pin 3.
- Inductor L3 is connected between CN1 Pin 4 and SW1 Pin 1.
- Inductor L4 is connected between CN1 Pin 5 and SW1 Pin 1.
- Capacitor C3 is connected between CN2 Pin 2 and ground.
- Capacitor C4 is connected between CN2 Pin 3 and ground.
- Capacitor C5 is connected between CN2 Pin 4 and ground.
- Capacitor C6 is connected between CN1 Pin 6 and ground.
- SW1 Pin 1 is connected to CN2 Pin 1.
- SW1 Pin 2 is connected to CN1 Pin 1.
- SW1 Pin 3 is connected to CN1 Pin 2.
- SW1 Pin 4 is connected to CN1 Pin 3.
- SW1 Pin 5 is connected to CN1 Pin 4.
- SW1 Pin 6 is connected to CN1 Pin 5.
- SW1 Pin 7 is connected to CN1 Pin 6.
- SW1 Pin 8 is connected to CN1 Pin 1.
- SW1 Pin 9 is connected to CN1 Pin 2.
- SW1 Pin 10 is connected to CN1 Pin 3.
- SW1 Pin 11 is connected to CN1 Pin 4.
- SW1 Pin 12 is connected to CN1 Pin 5.

CONDUCTOR VIEW OF ALC BOARD



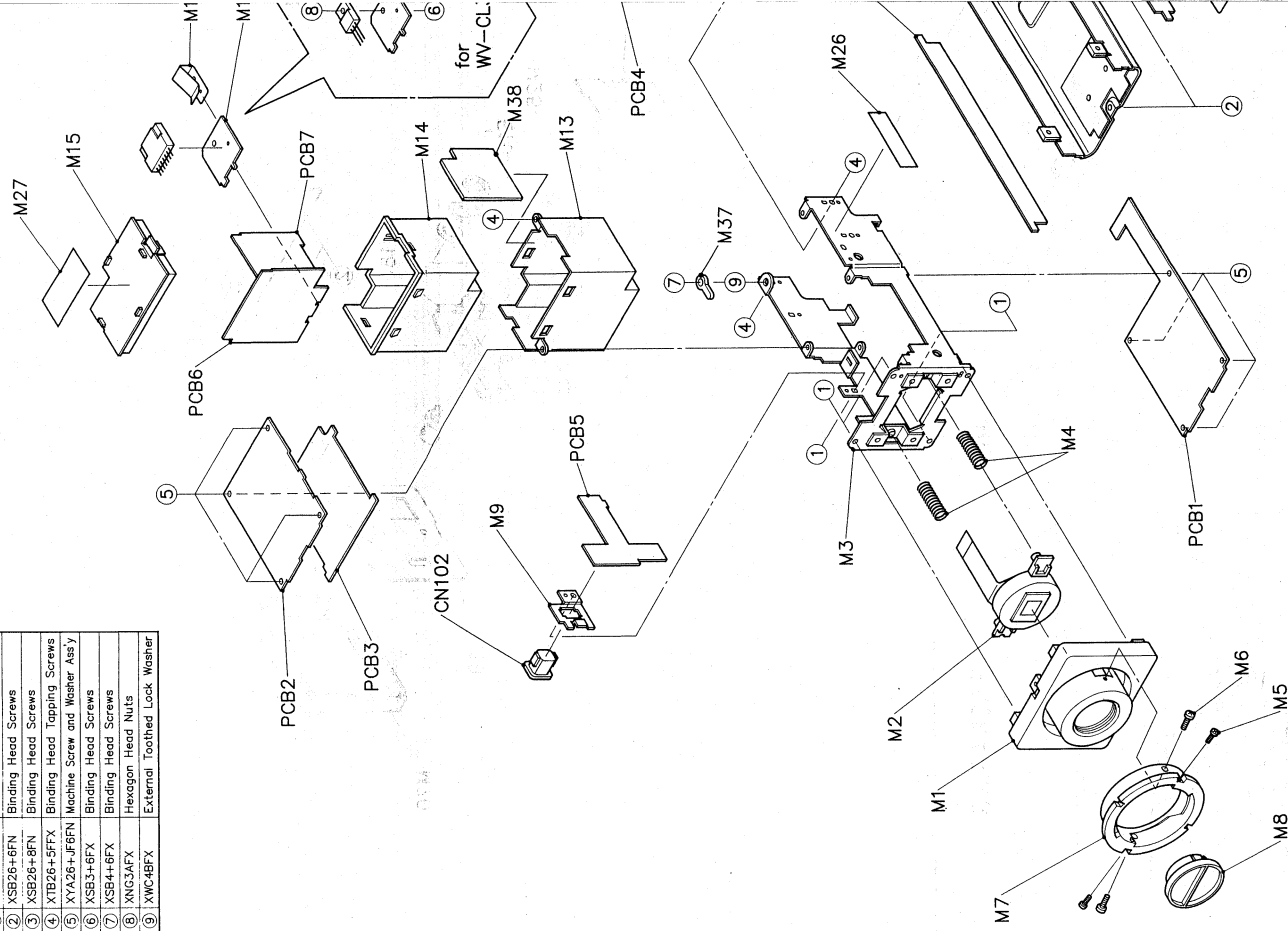


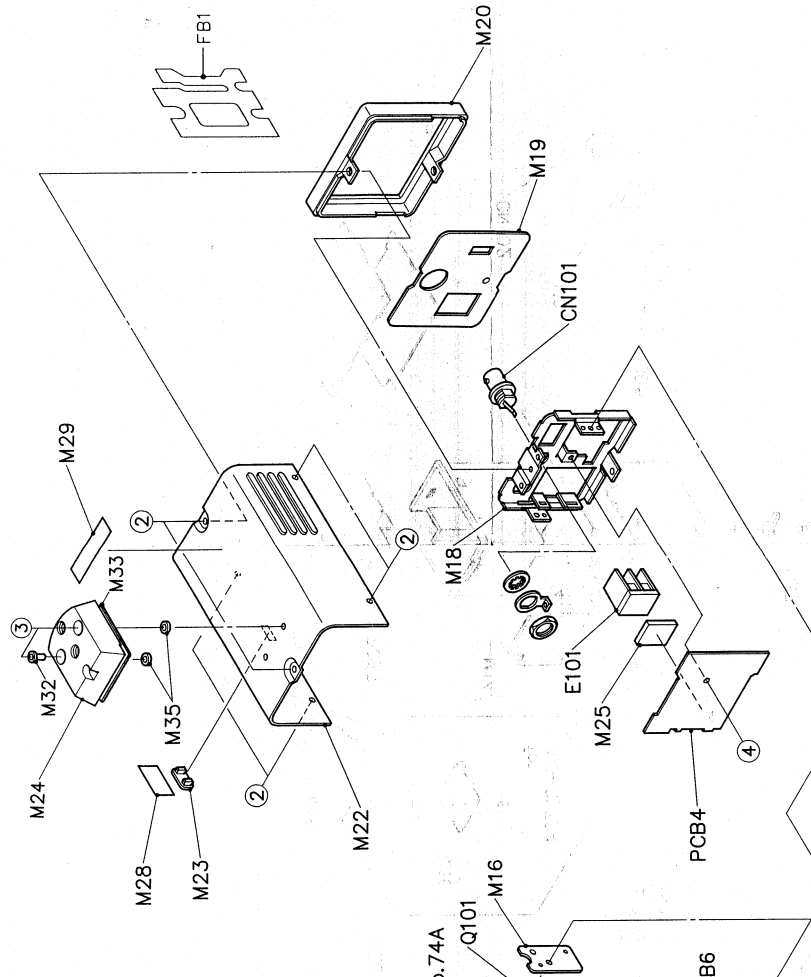
The top diagram shows the exploded view of the WV-CL324 camera. It includes a central body with a lens, a top cover, a bottom cover, and a mounting bracket. Callouts point to various parts: CN110 M41,42,43 (mounting bracket), M45 (lens assembly), M46 (top cover), M47 (bottom cover), M48 (mounting bracket), and WV-CL324 (camera body).

The bottom diagram shows the exploded view of the WV-CL320 camera. It includes a central body with a lens, a top cover, a bottom cover, and a mounting bracket. Callouts point to various parts: CN110 M41,42,43 (mounting bracket), M45 (lens assembly), M46 (top cover), M47 (bottom cover), M48 (mounting bracket), and WV-CL320 (camera body).

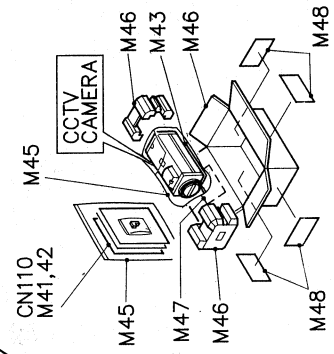
○ Numbers show screws, washers, nuts, etc.

No.	Screws	Description
①	XSB26+5FX	Binding Head Screws
②	XSB26+6FN	Binding Head Screws
③	XSB26+8FN	Binding Head Screws
④	XTB26+5FFX	Binding Head Tapping Screws
⑤	XYA26+J6FN	Machine Screw and Washer Assy
⑥	XSB3+6FX	Binding Head Screws
⑦	XSB4+6FX	Binding Head Screws
⑧	XNG3AFX	Hexagon Head Nuts
⑨	XWC48FX	External Toothed Lock Washer





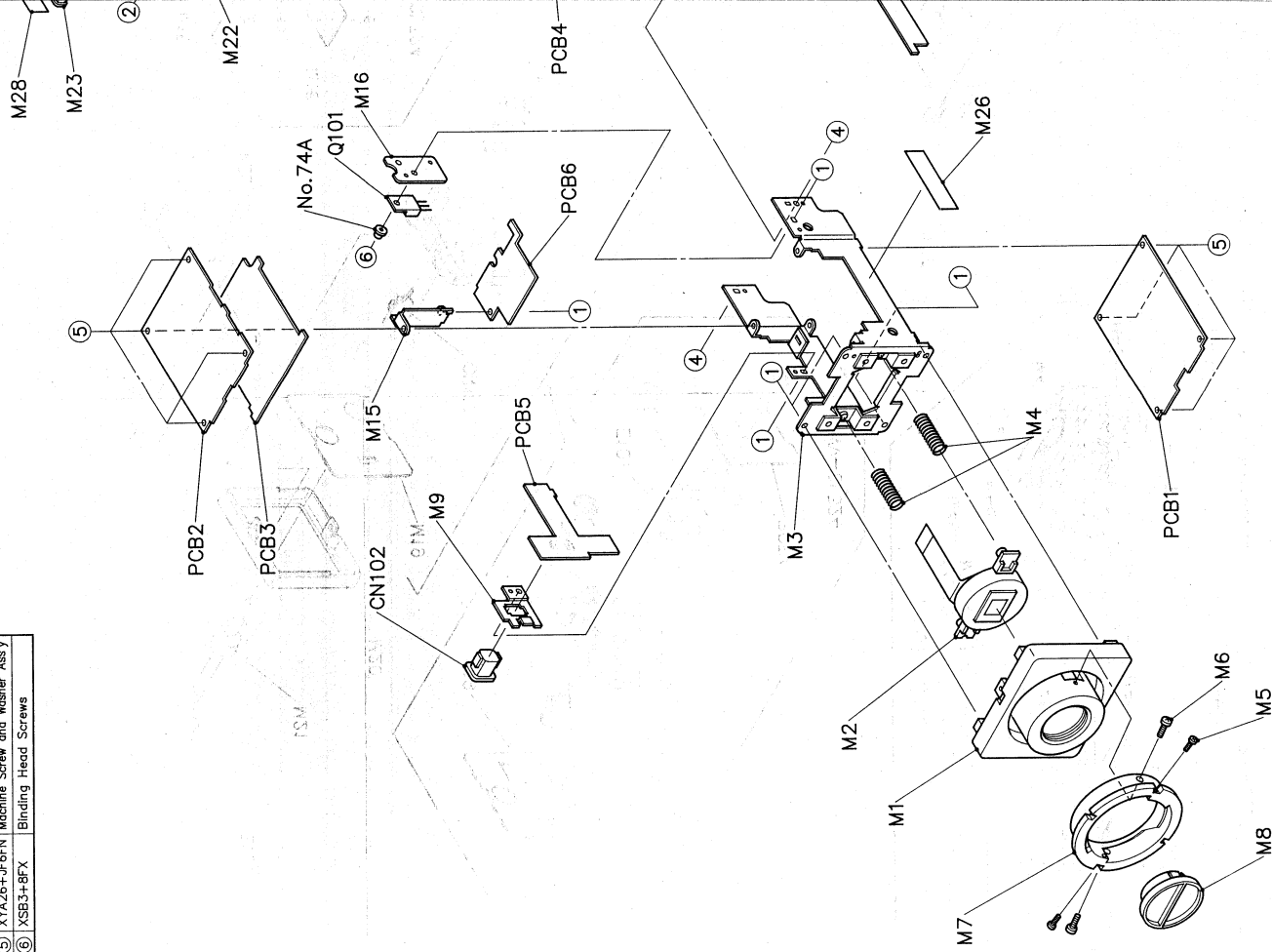
PACKAGING



EXPLODED VIEW

○ Numbers show screws, washers, nuts, etc.

No.	Screws	Description
①	XSB26+5FX	Binding Head Screws
②	XSB26+6FN	Binding Head Screws
③	XSB26+8FN	Binding Head Screws
④	XTB26+5FX	Binding Head Tapping Screws
⑤	XYA26+JF6FN	Machine Screw and Washer Assy
⑥	XSB3+8FX	Binding Head Screws



REPLACEMENT PARTS LIST

Important Notice

- Components identified by "△" mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
- RTL : Retention Time Limited

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
COLOUR CCTV CAMERA WV-CL320			DRIVE BOARD		
MISCELLANEOUS					
FB1 E101 △	YWCL320 YFKPGT5A25 YWGTS2R5B YFVM030908B	Flexible Board AC Power Cord for WV-CL320/A AC Power Cord for WV-CL320/B AC Power Cord for WV-CL320/G	PCB1 (RTL) IC1 IC2 IC3 IC4 IC5	YWVKBCL32E1A YWTC7532FR YWCKA1439M MN53003LBJ NJM3414M NJM2904M	Printed Circuit Board Assy IC IC IC IC IC IC
E110 M1 M2 M3	YWCD20YCAP YVW5BA082A2 YVWAKA0920AN YVW2SA1851A1	Insulator Cap for Cord Front Escutcheon Head Optical Assy Main Mounting Angle	IC6 IC7 ICB,9 IC10 IC20,21	YWM8621488U YWUPD16501GS MN13821P NJM3414M YWTC7532FR	IC IC IC IC IC
M4 M5 M6 M7 M8	YVW4JA0262A4 YVW1EA0127A4 YVW1EA0128A4 YVW3FA0101A3 YW8C-2B	Spring Special Screw Special Screw FB Control Ring Body Cap	IC22 Q1 Q2	YWM5237ML 25C4619 25C4627 25C4619 25C4627	IC Transistor or Transistor Transistor or Transistor
M10 M11 M12 M13 M14	YVW5WA1194A4 YVW5WA1195A4 YVW5EA0976A2 YVW7HA0970B2 YVW5KA1126A2	Right Side Panel Left Side Panel Bottom Cover Shield Parts Case	Q3 Q4 Q6	25C4619 25C4627 25C4619 25C4627 25K662-PQR	Transistor or Transistor Transistor or Transistor FET or
M15 M18 M19 M20 M21	YVW6EA0142A3 YVW2KA0654B2 YVW5WA1196A4 YVW5BA0083A3 YVSR6W1	Lid Rear Chassis Rear Panel Rear Escutcheon Cord Clamp	Q7 Q8 Q9 Q10	25K853 25B766-RS 25D875-QRS 25B766-RS 25A1576	Transistor Transistor Transistor Transistor Transistor or
M22 M23 M24 M26 M27	YVW5EA0975A2 YVW5GA0114A4 YVW2TB0240A3 YVW7MA0270A4 YVW7SA1197A4	Upper Cover Side Cap Mounting Bracket Safety Label Fuse Label	Q12 Q13	25B1218-QRS 25C4617 25D2216 25C4617 25D2216	Transistor Transistor or Transistor Transistor or Transistor
M28 M29 M30 △	YVW7SA1338A4 YFV7M80099A4 YVW7QA2852A4 YVW7QA2853A4 YVW7QA2854A4	Side Label UL Caution Label Main Label for WV-CL320/A Main Label for WV-CL320/B Main Label for WV-CL320/G	Q17 Q18 Q19	25A1774 25B1462 25A1774 25B1462 25C4617	Transistor or Transistor Transistor or Transistor Transistor or
M32 M33 M35 M37	YFV2NA0084A4 YFV2PA0207A4 YVW1KA0128A4 YW-BCG-EM01	Spacer Insulator Sheet Washer Earth Lug	Q20 Q21 Q22 Q23	25D2216 25C4617 25D2216 25C4617 25D2216 25C4617 25D2216 25A1774 25B1462	Transistor Transistor or Transistor Transistor or Transistor Transistor or Transistor Transistor or Transistor

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
Q24	25C4617	Transistor or	R36	ERJ3GEY0R00	Carbon 0 ohms 1/16W
	25D2216	Transistor	R37	ERJ3GEYJ101	Carbon 100 ohms 1/16W
Q33	25A1774	Transistor or	R38	YF2116121JT	Carbon 120 ohms 1/10W
	25B1462	Transistor	R40,43	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q34	25A1774	Transistor or	R44,45	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	25B1462	Transistor			
Q35	25A1774	Transistor or	R46	YF2116473GT	Carbon 47K ohms 1/10W
	25B1462	Transistor	R48	ERJ3GEYJ102	Carbon 1K ohms 1/16W
Q36	25A1774	Transistor or	R49	ERJ3GEYJ101	Carbon 100 ohms 1/16W
	25B1462	Transistor	R50	ERJ3GEYJ221	Carbon 220 ohms 1/16W
Q37	25B766-RS	Transistor	R51,52	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q38	25C4617	Transistor or	R53	ERJ3GEYJ681	Carbon 680 ohms 1/16W
	25D2216	Transistor	R54	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q39	25A1774	Transistor or	R55	ERJ3GEY0R00	Carbon 0 ohms 1/16W
	25B1462	Transistor	R56	YWR0816P123D	Metal 12K ohms 1/16W
D1	YWDA121	Diode or	R57	ERJ3GEYJ102	Carbon 1K ohms 1/16W
D2	MA132K	Diode	R58,60	ERJ3GEYJ103	Carbon 10K ohms 1/16W
	YWDA221	Diode or	R61	ERJ3GEY0R00	Carbon 0 ohms 1/16W
	MA133	Diode	R62	YWR0816P153D	Metal 15K ohms 1/16W
D4	YWDA221	Diode or	R63,66	ERJ3GEY0R00	Carbon 0 ohms 1/16W
	MA133	Diode	R68,70	ERJ3GEY0R00	Carbon 0 ohms 1/16W
D5	YWDZ11	Diode or	R72	YWR0816P302D	Metal 3K ohms 1/16W
	MA8110	Diode	R76	ERJ3GEYJ101	Carbon 100 ohms 1/16W
D6	YWDZ120	Diode or	R77	YWR0816P242D	Metal 2.4K ohms 1/16W
	MA8200	Diode	R78	ERJ3GEYJ102	Carbon 1K ohms 1/16W
D7,8	MA372	Diode	R79	YWR0816P332D	Metal 3.3K ohms 1/16W
D11	YWDA121	Diode or	R80	YWR0816P222D	Metal 2.2K ohms 1/16W
	MA132K	Diode	R82	ERJ3GEY0R00	Carbon 0 ohms 1/16W
D12	YWDA121	Diode or	R84	ERJ3GEYJ103	Carbon 10K ohms 1/16W
	MA132K	Diode	R85	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R1	ERJ3GEYJ912	Carbon 9.1K ohms 1/16W	R86	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
R2,3	ERJ3GEYJ911	Carbon 910 ohms 1/16W	R87,88	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R4	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R89	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R5,7	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	R90-92	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R9	ERJ3GEYJ391	Carbon 390 ohms 1/16W	R94	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R10	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R95	ERJ3GEYJ202	Carbon 2K ohms 1/16W
R11	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R96	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R12	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R99	ERJ3GEYJ243	Carbon 24K ohms 1/16W
R13	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	R101	ERJ3GEYJ105	Carbon 1M ohms 1/16W
R14	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R104	ERJ3GEYJ104	Carbon 100K ohms 1/16W
R15	ERJ3GEYJ331	Carbon 330 ohms 1/16W	R109,112	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R16	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R113	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R18	ERJ3GEYJ331	Carbon 330 ohms 1/16W	R114	ERJ3GEYJ620	Carbon 62 ohms 1/16W
R21	ERJ3GEY0R00	Carbon 0 ohms 1/16W	R115	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R22	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R116	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
R24	ERJ3GEYJ302	Carbon 3K ohms 1/16W	R117	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R26	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R118	YWR0816P302D	Metal 3K ohms 1/16W
R27,28	ERJ3GEY0R00	Carbon 0 ohms 1/16W	R119	YWR0816P153D	Metal 15K ohms 1/16W
R29	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W	R120	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
R32	ERJ3GEY0R00	Carbon 0 ohms 1/16W	R121	ERJ3GEYJ100	Carbon 10 ohms 1/16W
R33,34	ERJ3GEYJ100	Carbon 10 ohms 1/16W	R122	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
			R123	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
			R124	YWR0816P472D	Metal 4.7K ohms 1/16W
			R125	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R126	YWR0816P243D	Metal 24K ohms 1/16W
			R127	YWR0816P103D	Metal 10K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION		
R130	YWR0816P242D	Metal	2.4K ohms 1/16W	C44	ECST1CC1062R	Tantalum	10 μ F 16V or
R131	YWR0816P153D	Metal	15K ohms 1/16W		YW5K1C106KRC	Electrolytic	10 μ F 16V
R133	ERJ3GEY0R00	Carbon	0 ohms 1/16W	C45	ECST1CC1062R	Tantalum	10 μ F 16V or
R134	ERJ3GEYJ104	Carbon	100K ohms 1/16W		YW5K1C106KRC	Electrolytic	10 μ F 16V
R136	ERJ3GEYJ103	Carbon	10K ohms 1/16W	C46	ECEV1HV2R2	Electrolytic	2.2 μ F 50V
R137	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W	C47	ECEV1CV470	Electrolytic	47 μ F 16V
R139	ERJ3GEYJ153	Carbon	15K ohms 1/16W	C48	ECEV1EV220	Electrolytic	22 μ F 25V
R140	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C49,50	ECEV1CV470	Electrolytic	47 μ F 16V
R141	ERJ3GEYJ154	Carbon	150K ohms 1/16W	C51	ECEV1CV100	Electrolytic	10 μ F 16V
R142	ERJ3GEY0R00	Carbon	0 ohms 1/16W	C52	ECEV1CV470	Electrolytic	47 μ F 16V
R143	ERJ3GEYJ103	Carbon	10K ohms 1/16W	C53	ECST1AD4762R	Tantalum	47 μ F 10V
R144	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C54	ECEV1CV470	Electrolytic	47 μ F 16V
R145,146	YWR0816P103D	Metal	10K ohms 1/16W	C56	ECST1CC1062R	Tantalum	10 μ F 16V or
R147	ERJ3GEYJ560	Carbon	56 ohms 1/16W	C57	ECST1V685	Tantalum	6.8 μ F 35V
R148	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W	C60	ECEV1CV100	Electrolytic	10 μ F 16V
R153,154	ERJ3GEY0R00	Carbon	0 ohms 1/16W	C62	ECEV1HV100SP	Electrolytic	10 μ F 50V
R155,156	ERJ3GEYJ473	Carbon	47K ohms 1/16W	C63	ECEV1EV220	Electrolytic	22 μ F 25V
R160	ERJ3GEY0R00	Carbon	0 ohms 1/16W	C68,70	ECEV1CV470	Electrolytic	47 μ F 16V
R213	ERJ3GEYJ122	Carbon	1.2K ohms 1/16W	C72	ECST0GX1062L	Tantalum	10 μ F 4V
R214	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W	C74	ECST1CV1052R	Tantalum	1 μ F 16V
R215	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W	C77	YW5F473Z2VB	Ceramic	0.047 μ F
R216	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W	C78	YW5X222K5VB	Ceramic	2200 pF
R217	ERJ3GEYJ101	Carbon	100 ohms 1/16W	C79,81	YW5F104Z2VB	Ceramic	0.1 μ F
R219-221	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C82,83	ECEV1CV100	Electrolytic	10 μ F 16V
R225	ERJ3GEYJ151	Carbon	150 ohms 1/16W	C95	ECEV1CV470	Electrolytic	47 μ F 16V
R228	ERJ3GEYJ331	Carbon	330 ohms 1/16W	C105	YW5CH151J5VB	Ceramic	150 pF
R229	ERJ3GEYJ821	Carbon	820 ohms 1/16W	C106	YW5CH101J5VB	Ceramic	100 pF
R232	YF2116101JT	Carbon	100 ohms 1/10W	C107	YW5CH120J5VB	Ceramic	12 pF
R233	YWR0816P392D	Metal	3.9K ohms 1/16W	C108	ECEV1CV470	Electrolytic	47 μ F 16V
R234	YWR0816P123D	Metal	12K ohms 1/16W	C109	ECEV1EV220	Electrolytic	22 μ F 25V
R235	ERJ3GEYJ221	Carbon	220 ohms 1/16W	C110-114	ECEV1CV470	Electrolytic	47 μ F 16V
R236	YWR0816P823D	Metal	82K ohms 1/16W	C115	ECEV1CV100	Electrolytic	10 μ F 16V
R237,238	ERJ6GEY0R00	Carbon	0 ohms 1/16W	C117	ECEV1HV47R5P	Electrolytic	4.7 μ F 50V
C5,6	YW5CH100J5VB	Ceramic	10 pF	C118-120	YW5X102K5VB	Ceramic	1000 pF
C7	YW5X103K2VB	Ceramic	0.01 μ F	C123,124	YW5X102K5VB	Ceramic	1000 pF
C8	YW5SL102K5VB	Ceramic		C125	YW5F104Z2VB	Ceramic	0.1 μ F
C9	YW5CH101J5VB	Ceramic	100 pF	L1,5	ELJFCB2MF	Coil	8.2 μ H
C10	YW5CH331J5VB	Ceramic	330 pF	L6	ELJFCB2MF	Coil	8.2 μ H
C12	YW5F104Z2VB	Ceramic	0.1 μ F	L7	YWNL32T221K	Coil	220 μ H
C13	YW5CH331J5VB	Ceramic	330 pF	L8,9	YWCD75101KC	Coil	100 μ H
C14,15	YW5X103K2VB	Ceramic	0.01 μ F	L10	ELJFCB2MF	Coil	8.2 μ H
C16	YW5CH101J5VB	Ceramic	100 pF	L12	ELJFCB2MF	Coil	8.2 μ H
C19	YW5F104Z2VB	Ceramic	0.1 μ F	L13	YWCD75101KC	Coil	100 μ H
C26	YF400224FZT	Ceramic	0.22 μ F	L15,18	ELJFCB2MF	Coil	8.2 μ H
C28	YW5X103K2VB	Ceramic	0.01 μ F	CF1	ELB48532	Filter	
C33,35	YF400104FZT	Ceramic	0.1 μ F	CN1	YW523961490	14-pin Connector	
C36	YF400104FZT	Ceramic	0.1 μ F	CN2	YW522051890	18-pin Connector	
C37	ECEV1CV470	Electrolytic	47 μ F 16V	CN3	YW522051490	14-pin Connector	
C38	ECEV1CV100	Electrolytic	10 μ F 16V	CN4	YW31756356	6-pin Connector	
C39	ECST1VY1042R	Tantalum	0.1 μ F 35V or	CN5	YW41756350	10-pin Connector	
C40	YWK235A0R1R	Electrolytic	0.1 μ F	CN6	YW41756316	16-pin Connector	
C41	ECST1DC106	Tantalum	10 μ F 20V	CN7	YW522051890	18-pin Connector	
	YWK1C106KRC	Electrolytic	10 μ F 16V	TP1,4	YWRECT2125TPV	Test Point	
C43	ECEV1CV100	Electrolytic	10 μ F 16V				

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
DIGITAL BOARD			R38-41	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
			R42-44	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
			R45,46	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R47	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
			R48	ERJ3GEYJ101	Carbon 100 ohms 1/16W
			R50	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
			R53	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R56	ERJ3GEYJ101	Carbon 100 ohms 1/16W
			R58,59	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R68,69	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R72,73	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R76	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R77	ERJ3GEYJ100	Carbon 10 ohms 1/16W
			R78,79	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R82,85	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
			R94	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
			R95	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R96	YWR0816P221D	Metal 220 ohms 1/16W
			R97	YWR0816P102D	Metal 1K ohms 1/16W
			R98	YWR0816Q560D	Metal 56 ohms 1/16W
			R99	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R100,101	YWR0816P221D	Metal 220 ohms 1/16W
			R104	YWR0816P472D	Metal 4.7K ohms 1/16W
			R105	YWR0816P562D	Metal 5.6K ohms 1/16W
			R106,113	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
			R114	ERJ3GEYJ103	Carbon 10K ohms 1/16W
			R115	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
			R116	ERJ3GEYJ271	Carbon 270 ohms 1/16W
			R117	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
			R118-120	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R122	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R123	ERJ3GEYJ105	Carbon 1M ohms 1/16W
			R133,136	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R137-148	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R150-157	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R158	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
			R159	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R160	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
			R161	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
			R162	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
			R163,164	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
			R168-180	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R184,185	ERJ3GEYJ473	Carbon 47K ohms 1/16W
			R186	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R187	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R188	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
			R189	ERJ3GEYJ103	Carbon 10K ohms 1/16W
			R190	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R191	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R192	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
			R193	ERJ3GEYJ821	Carbon 820 ohms 1/16W
			R194	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
			R196	ERJ3GEYJ2R2	Carbon 2.2 ohms 1/16W
			R197	ERJ3GEYJ221	Carbon 220 ohms 1/16W
			R198	ERJ3GEYJ103	Carbon 10K ohms 1/16W
PCB2 (RTL)	YWVKCL32E1A	Printed Circuit Board Assy			
IC1	AN2015FAP	IC			
IC2,3	NJM4558M	IC			
IC6	YWXC01175AM	IC			
IC7	YWM6M80021FP	IC			
IC8	MN6730FHP	IC			
IC9	MN6731FHP	IC			
IC10	MN188166CUD	IC			
IC12	MN65701FHP	IC			
IC13	MN53020LB01	IC			
Q8	25C4617	Transistor or			
	25D2216	Transistor			
Q9	25A1774	Transistor or			
	25B1462	Transistor			
Q10	25A1774	Transistor or			
	25B1462	Transistor			
Q11	25C4617	Transistor or			
	25D2216	Transistor			
Q14	25C4617	Transistor or			
	25D2216	Transistor			
Q15	25C4617	Transistor or			
	25D2216	Transistor			
Q16	25C4617	Transistor or			
	25D2216	Transistor			
Q17	25C4617	Transistor or			
	25D2216	Transistor			
Q18-21	FA3L42T18	Transistor			
Q26	25A1774	Transistor or			
	25B1462	Transistor			
Q27	25C4617	Transistor or			
	25D2216	Transistor			
D2	YWDA221	Diode or			
	MA133	Diode			
D3	YWDA221	Diode or			
	MA133	Diode			
D4	YWDA221	Diode or			
	MA133	Diode			
TH215	L311F431J502	Thermistor			
R9	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W			
R19	ERJ3GEYJ473	Carbon 47K ohms 1/16W			
R20	ERJ3GEYJ103	Carbon 10K ohms 1/16W			
R21	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W			
R23	ERJ3GEYJ112	Carbon 1.1K ohms 1/16W			
R25	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W			
R28	ERJ3GEYJ391	Carbon 390 ohms 1/16W			
R30	ERJ3GEY0R00	Carbon 0 ohms 1/16W			
R31	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W			
R33	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W			
R34,36	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W			
R37	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W			

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
R199	ERJ3GEYJ181	Carbon	180 ohms 1/16W	C80	ECST1AC106	Tantalum	10 μ F 10V or
R214	ERJ3GEYJ104	Carbon	100K ohms 1/16W		YWK210C100R	Tantalum	10 μ F 10V
Z1-6	EXBV8V470J	Block Resistor		C82	ECEV1CV100	Tantalum	10 μ F 16V
C3	YW5F47322VB	Ceramic	0.047 μ F	C83	ECST1AC106	Tantalum	10 μ F 10V or
C6-8	YW5CH120J5VB	Ceramic	12 pF		YWK210C100R	Tantalum	10 μ F 10V
C9	YW5CH151J5VB	Ceramic	150 pF	C84-86	ECST1AC226	Tantalum	22 μ F 10V
C10	YW5CH101J5VB	Ceramic	100 pF	C87	ECST0J8106ZR	Tantalum	10 μ F 6.3V
C12	YW5CH120J5VB	Ceramic	12 pF	C88	ECST1AC106	Tantalum	10 μ F 10V or
C15	YW5CH330J5VB	Ceramic	33 pF		YWK210C100R	Tantalum	10 μ F 10V
C16	YW5CH151J5VB	Ceramic	150 pF	C90,91	ECST1A8106	Tantalum	10 μ F 10V
C17	YW5X102K5VB	Ceramic	1000 pF	C92	ECST1AD476ZR	Tantalum	47 μ F 10V
C18	YW5CH120J5VB	Ceramic	12 pF	C93	YW5F104Z2VB	Ceramic	0.1 μ F
C20	YW5CH150J5VB	Ceramic	15 pF	C96	ECST1AY475	Tantalum	4.7 μ F 10V
C21	YW5CH101J5VB	Ceramic	100 pF	L1,2	ELJFC8R2MF	Coil	8.2 μ H
C22	YW5CH151J5VB	Ceramic	150 pF	L4,7	ELJFC8R2MF	Coil	8.2 μ H
C23	YW5F104Z2VB	Ceramic	0.1 μ F	L8,10	ELJFC8R2MF	Coil	8.2 μ H
C27,29	YW5CH101J5VB	Ceramic	100 pF	L11,13	ELJFC8R2MF	Coil	8.2 μ H
C32,35	YW5F104Z2VB	Ceramic	0.1 μ F	L14,25	ELJFC8R2MF	Coil	8.2 μ H
C36	YW400474F	Ceramic	0.47 μ F	L30	ELJFC8R2MF	Coil	8.2 μ H
C37	YW5F104Z2VB	Ceramic	0.1 μ F	X1	EF0V8004E0A	Crystal Oscillator	
C38-40	YW5CH120J5VB	Ceramic	12 pF	CF4	ELB4A512	Filter	
C45	YW5F104Z2VB	Ceramic	0.1 μ F	CF5	EIK4EW001T	Filter	
C46,47	YF400104FZT	Ceramic	0.1 μ F	CF6	EIK4EW002T	Filter	
C48	ECST0JY335	Tantalum	3.3 μ F 6.3V	CN1,2	YW71756436	16-pin Connector	
C49,50	YF400103XKT	Ceramic	0.01 μ F	CN3,4	YW523961890	18-pin Connector	
C56	ECST0JY475	Tantalum	4.7 μ F 6.3V	CN5,6	YW31756316	6-pin Connector	
C57	ECST0JY685	Tantalum	6.8 μ F 6.3V	R201,204	ERJ6GEYOR00	Jumper Resistor	
C58	ECST1A8106	Tantalum	10 μ F 10V	R206-213	ERJ6GEYOR00	Jumper Resistor	
C59	ECST0G8226ZR	Tantalum	22 μ F 4V				
C60	ECST0JY475	Tantalum	4.7 μ F 6.3V				
C61	ECST0GY475Z	Tantalum	4.7 μ F 4V				
C62	ECST1DC685ZR	Tantalum	6.8 μ F 20V				
C63	ECST1CB475ZR	Tantalum	4.7 μ F 16V				
C64	ECST1AD476ZR	Tantalum	47 μ F 10V				
C65	ECST1VY104ZR	Tantalum	0.1 μ F 35V				
	YWK235A0R1R	Tantalum	0.1 μ F 35V				
C67	ECST1AC106	Tantalum	10 μ F 10V				
	YWK210C100R	Tantalum	10 μ F 10V				
C69	ECST1A8106	Tantalum	10 μ F 10V				
C70	ECST0GY406	Tantalum	10 μ F 4V				
C71	ECST1A8106	Tantalum	10 μ F 10V				
C72	ECST1CC106ZR	Tantalum	10 μ F 16V				
	YWSK1C106KRC	Tantalum	10 μ F 16V				
C73	ECST1AC106	Tantalum	10 μ F 10V or				
	YWK210C100R	Tantalum	10 μ F 16V				
C75	ECST1AC106	Tantalum	10 μ F 10V or				
	YWK210C100R	Tantalum	10 μ F 16V				
C77	ECST1AC106	Tantalum	10 μ F 10V or				
	YWK210C100R	Tantalum	10 μ F 10V				
C78	ECST1AC106	Tantalum	10 μ F 10V or				
	YWK210C100R	Tantalum	10 μ F 10V				

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
SYNC/ENCODER BOARD					
PCB3 (RTL)	YWVKDC132E1A	Printed Circuit Board Assy	R30	ERJ3GEY0R00	Carbon 0 ohms 1/16W
IC4	AN2254FAP	LSI	R32	ERJ3GEYJ102	Carbon 1K ohms 1/16W
IC5	YWM62352GP	IC	R33	ERJ3GEYJ511	Carbon 510 ohms 1/16W
IC7	MN73069LBM2	IC	R34,35	ERJ3GEYJ102	Carbon 1K ohms 1/16W
IC8	NJM2903M	IC	R37	ERJ3GEYJ561	Carbon 560 ohms 1/16W
IC9	YWTC7532FR	IC			
IC10	YWTC4569F	IC	R39	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
IC11,12	YWTC7504F	IC	R41,43	ERJ3GEYJ221	Carbon 220 ohms 1/16W
Q2,3	2SK662-PQR	FET	R44	ERJ3GEYJ182	Carbon 1.8K ohms 1/16W
Q7	2SK853	Transistor	R45,46	ERJ3GEYJ102	Carbon 1K ohms 1/16W
Q10	2SA1774	Transistor or	R47	ERJ3GEYJ221	Carbon 220 ohms 1/16W
	2SB1462	Transistor	R48,50	ERJ3GEYJ102	Carbon 1K ohms 1/16W
Q11	2SA1774	Transistor or	R51,52	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SB1462	Transistor	R56	ERJ3GEYJ334	Carbon 330K 1/16W
Q29	2SC4617	Transistor or	R58	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
	2SD2216	Transistor	R59	ERJ3GEYJ104	Carbon 100K ohms 1/16W
Q45	UMX1	Transistor or	R62	ERJ3GEYJ105	Carbon 1M ohms 1/16W
	XP4501	Transistor	R63	ERJ3GEYJ823	Carbon 82K ohms 1/16W
Q46	2SC4617	Transistor or	R66,67	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SD2216	Transistor	R70	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q47	2SA1774	Transistor or	R71	ERJ3GEYJ105	Carbon 1M ohms 1/16W
	2SB1462	Transistor	R73	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q48	2SA1774	Transistor or	R74,75	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SB1462	Transistor	R77	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q49	2SC4617	Transistor or	R79	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SD2216	Transistor	R80	YWR0816P331D	Metal 330 ohms 1/16W
Q50	UMZ1	Transistor or	R82	ERJ3GEYJ821	Carbon 820 ohms 1/16W
	XP4601	Transistor	R83	ERJ3GEYJ102	Carbon 1K ohms 1/16W
D1	YWDA120	Diode or	R84	YWR0816P681D	Metal 680 ohms 1/16W
	MA132A	Diode	R85	ERJ3GEYJ103	Carbon 10K ohms 1/16W
D2-7	MA372	Diode	R86	ERJ3GEYJ334	Carbon 330K 1/16W
D8,9	MA729	Diode	R88	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W
D10	YWDA120	Diode or	R89	ERJ3GEY0R00	Carbon 0 ohms 1/16W
	MA132A	Diode	R90	ERJ3GEYJ113	Carbon 11K ohms 1/16W
D11	YWDA120	Diode or	R91	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	MA132A	Diode	R92	ERJ3GEYJ912	Carbon 9.1K ohms 1/16W
TH132	L311F431J502	Thermistor	R95	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R1	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	R97	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R3	ERJ3GEYJ183	Carbon 18K ohms 1/16W	R102	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R9	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R103	ERJ3GEYJ391	Carbon 390 ohms 1/16W
R10	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R107	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R11,12	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R110	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R13	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R112	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
R14	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R113	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R16	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R120,123	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R17	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R124,129	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R18	ERJ3GEYJ184	Carbon 180K ohms 1/16W	R144	ERJ3GEYJ223	Carbon 22K ohms 1/16W
R19	ERJ3GEYJ223	Carbon 22K ohms 1/16W	R148	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W
R21-24	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R163	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R27	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R166	ERJ3GEYJ561	Carbon 560 ohms 1/16W
R28,29	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R167	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
			R168	ERJ3GEYJ202	Carbon 2K ohms 1/16W
			R170	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R176,179	YWR0816P471D	Metal 470 ohms 1/16W
			R182	YWR0816P302D	Metal 3K ohms 1/16W
			R183	YWR0816P751D	Metal 750 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
R187	ERJ3GEY0R00	Carbon	C73	ECST1AC106	Tantalum 10 F 10V or
R188	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W		YWK210C100R	Tantalum 10 μ F 10V
R189	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C74	ECST1CY105ZR	Tantalum 1 μ F 16V
R190	ERJ3GEYJ393	Carbon 39K ohms 1/16W	C75	ECST1AY225ZR	Tantalum 2.2 μ F 10V
R191	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	C76	ECST1AC156	Tantalum 15 μ F 10V
R192	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C77	ECST1VY224Z	Tantalum 0.22 μ F 35V or
R193	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W		YWK235AR22R	Tantalum 0.22 μ F 35V
R194	ERJ3GEYJ393	Carbon 39K ohms 1/16W	C78	ECST1AC156	Tantalum 15 μ F 10V
R195	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	C79	ECST0GC336ZR	Tantalum 33 μ F 4V or
R196	ERJ3GEYJ113	Carbon 11K ohms 1/16W		YWK24C330R	Tantalum 33 μ F 4V
R198	ERJ3GEYJ101	Carbon 100 ohms 1/16W	C81	ECST1CC106ZR	Tantalum 10 μ F 16V or
R199,200	ERJ3GEY0R00	Carbon		YWSK1C106KRC	Tantalum 10 μ F 16V
R203	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W	C82	ECST1CC105ZR	Tantalum 10 μ F 16V or
R204	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W		YWSK1C106KRC	Tantalum 10 μ F 16V
R205	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C83	ECEV1CV100	Tantalum 10 μ F 16V
R206,210	ERJ3GEY0R00	Carbon 0 ohms 1/16W	C86	YWSCH101J5VB	Ceramic 100 PF
R212	ERJ3GEY0R00	Carbon 0 ohms 1/16W	C87	YWSF104Z2VB	Ceramic 0.1 μ F
R213	ERJ3GEYJ104	Carbon 100K ohms 1/16W	C88	ECEV1CV100	Tantalum 10 μ F 16V
R214,215	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	C89	ECST1CY105ZR	Tantalum 1 μ F 16V
R216	ERJ3GEYJ151	Carbon 150 ohms 1/16W	C90	YWSF104Z2VB	Ceramic 0.1 μ F
R217	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C91	YWSCH510J5VB	Ceramic 51 pF
R218	ERJ3GEYJ221	Carbon 220 ohms 1/16W	C92	ECST1CY105ZR	Tantalum 1 μ F 16V
R219	ERJ3GEYJ751	Carbon 750 ohms 1/16W	C93	ECEV1CV100	Tantalum 10 μ F 16V
C4,5	YWSCH151J5VB	Ceramic 150 pF	C94	ECST1ED106ZR	Tantalum 10 μ F 25V
C6	YWSF104Z2VB	Ceramic 0.1 μ F	C95,97	ECEV1CV470	Tantalum 47 μ F 16V
C7	YWSCH121J5VB	Ceramic 120 pF	C98	YF40022AFZT	Ceramic 0.22 μ F
C8	YWSX103K2VB	Ceramic 0.01 μ F	C99	YWSF104Z2VB	Ceramic 0.1 μ F
C9	YWSCH910J5VB	Ceramic 91 pF	C100	YWSCH221J5VB	Ceramic 220 pF
C10	YWSCH750J5VB	Ceramic 75 pF	L1,3	ELJFCBR2MF	Coil 8.2 μ H
C11,12	YF400104FZT	Ceramic 0.1 μ F	L5	EK4EJ003E	Coil
C17	YWSCH331J5VB	Ceramic 330 pF	L7-11	ELJFCBR2MF	Coil 8.2 μ H
C18	YWSF104Z2VB	Ceramic 0.1 μ F	X1	YWDX17R734	Crystal Oscillator
C19	YF400104FZT	Ceramic 0.1 μ F	X2	YWDX14R187	Crystal Oscillator
C21	YWSCH271J5VB	Ceramic 270 pF	CF3	ELB4D537	Filter
C22	YWSCH331J5VB	Ceramic 330 pF	CF6	YWNL453254R4	Filter
C23	YWSCH271J5VB	Ceramic 270 pF	CN1,2	YW41756386	16-pin Connector
C24,25	YWSX103K2VB	Ceramic 0.01 μ F	CN3	YWS23961490	14-pin Connector
C26	YWSCH270J5VB	Ceramic 27 pF	TP1-3	YWRCT2125TPV	Test Point
C28	YWSX103K2VB	Ceramic 0.01 μ F	TP7	YWRCT2125TPV	Test Point
C32,33	YF426104XK5	Ceramic 0.1 μ F			
C34,35	YWSF104Z2VB	Ceramic 0.1 μ F			
C45	YWSX103K2VB	Ceramic 0.01 μ F			
C46	YW400393XKT	Ceramic 0.039 μ F			
C47-52	YF400104FZT	Ceramic 0.1 μ F			
C53	ECST0JY335	Tantalum 3.3 μ F 6.3V			
C54,56	YF400104FZT	Ceramic 0.1 μ F			
C64	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Tantalum 10 μ F 10V			
C66	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Tantalum 10 μ F 10V			
C67	ECEV1EV220	Tantalum 22 μ F 25V			
C69	ECST0JB106ZR	Tantalum 10 μ F 6.3V			
C71	ECST1AC156	Tantalum 15 μ F 10V			

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
REAR BOARD			POWER SUB BOARD		
PCB4 (RTL) D1 R1 VR1 C1	YWVKYL320P2A LN277RPX ERD52TJ751 EVML1GA00814 RPE132F104Z	Printed Circuit Board Assy LED Carbon 750 ohms 1/4W Variable Resistor 10K ohms Ceramic 0.1 μ F	PCB7 (RTL) IC1 Q6	YWVKYL320E5A YWNJM431UTE1 CNY17F3G CNY17F3G1 YWPC111-B	Printed Circuit Board Assy IC Transistor or Transistor or Transistor
C2,3 C4 SW1 CN1 CN101	ECEA0JK5331 ECEA0JU471 YFKSD04 YW41746436 YWHXC0325900	Electrolytic 330 μ F 6.3V Electrolytic 470 μ F 6.3V Slide Switch 16-pin Connector BNC Connector	Q7 D1-3 R22	CNY17F3G CNY17F3G1 YWPC111-B YWF1H4TP ERJ8GCSJ471	Transistor or Transistor or Transistor Diode Carbon 470 ohms 1/8W
ALC BOARD			R23 R25 R26 R27 R28-33	ERJ8GCSJ392 ERJ8GCSG302 ERJ8GCSG151 ERD50TJ334 ERJ14YJ164	Carbon 3.9K ohms 1/8W Carbon 3K ohms 1/8W Carbon 150 ohms 1/8W Carbon 330K ohms 1/2W Carbon 160K 1/4W
PCB5 C3-5 C6 L1-4 SW1	YWVRYCL32P3B YWSX102K5VB YWSF104Z2VB ELJFCR68MF SS5342L4N	Printed Board Ceramic 1000 pF Ceramic 0.1 μ F Coil 0.68 μ H Slide Switch	R204 C11 C19 C22 C24	ERJ8GCSJ222 YF426223XK5 ECA1EXS330 ECEA1AKG101 ECA1CX5470	Carbon 2.2K ohms 1/8W Ceramic 0.022 μ F 50V Electrolytic 33 μ F 25V Electrolytic 100 μ F 10V(KS) Electrolytic 47 μ F 16V
CN1 CN102 M9	YW1746366 YFD4151N200 YWV25A1859A4	6-pin Connector Lens Connector Mounting Angle	C25 CN1 E1 E2	ECEA1AKG101 YW11746360 JMI8LH04AAT JMI6LH04AAT	Electrolytic 100 μ F 10V(KS) 10-pin Connector 4-pin Connector 4-pin Connector
POWER BOARD			ACCESSORY PARTS/PACKAGING PARTS		
PCB6 (RTL) IC2 D4 D6 V51	YWVKYCL32E4A YWMA1050 YWER1502 YWS1VB40 ERZC07DK471	Printed Circuit Board Assy IC Diode Diode ZNR	CN110 M41 M43 M45	YFE4191J00 YWV8QA2848AN YWT050803 YWT20X35C03	ALC Connector Operating Instructions Polyethylene Bag Polyethylene Bag
R11 R12 R13 R14 R18	YWSR3224J ERJ8GCSJ824 ERJ8GCSG101 ERJ8GCSJ331 ERJ8GCSG221	Metal 220K ohms Carbon 820K ohms 1/8W Carbon 100 ohms 1/8W Carbon 330 ohms 1/8W Carbon 220 ohms 1/8W	M46 M47	YWV9CA1848AN YWV9CA1849AN YWV9CA1850AN YFV8FA0201A4	Packaging Assy for WV-CL320/A Packaging Assy for WV-CL320/B Packaging Assy for WV-CL320/G Packaging Label for WV-CL320/B
C5 C6 C8 C12 C17	ECKD3A221KBN ECQU2A333MV YWDE710F2472 ECKDRS472ME ECKDHT102KB	Ceramic 220 pF 1KV Plastic 0.033 μ F Ceramic 4700 pF Ceramic 4700 pF Ceramic 1000 pF			
C18 C26 T2 CF1 F1	RJ3400V100M ECKDRS472ME YWPCIW19A YWFC061 XBA2C04ET0A	Electrolytic 10 μ F 400V Ceramic 4700 pF Power Transformer Filter Current Fuse 0.4A 250V			
E1,2 E3 E10 M16 M17	S-N5057 YWPP120 YWBS1440 YWV7DA0284A4 YWV2CA0330A4	Fuse Holder Terminal Insulator Heat Sink Hold Plate			

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
COLOUR CCTV CAMERA WV-CL322			DRIVE BOARD		
MISCELLANEOUS					
FB1	YWCL320	Flexible Board	PCB1 (RTL)	YWVK8CL32E2A	Printed Circuit Board Assy
Q101	ZS8941-PQR	Transistor	IC1	YWTC7532FR	IC
M1	YWV5BA0082A2	Front Escutcheon	IC2	YWCCA1439M	IC
M2	YWVAKA0920AN	Head Optical Assy	IC3	MNS3003LBJ	IC
M3	YWV2SB1851A1	Main Mounting Angle	IC5	NJM2904M	IC
			IC6	YWM8621488U	IC
M4	YWV4JA0262A4	Coil Spring	IC7	YWUPD16501GS	IC
M5	YWV1EA0127A4	Special Screw for FB Lock	IC8,9	MN13821P	IC
M6	YWV1EA0128A4	Special Screw for Front Ring	IC10	NJM3414M	IC
M7	YWV3FA0101A3	FB Control Ring	IC14	NJM2904M	IC
M8	YW8C-2B	Body Cap	IC20,21	YWTC7532FR	IC
M10	YWV5WA1197A4	Right Side Panel	Q1	2SC4619	Transistor or
M11	YWV5WA1198A4	Left Side Panel		2SC4627	Transistor
M12	YWV5EA0978A2	Bottom Cover	Q2	2SC4619	Transistor or
M18	YWV2KA0655B2	Rear Chassis		2SC4627	Transistor
M19	YWV5WA1451A4	Rear Panel	Q3	2SC4619	Transistor or
M20	YWV5BA0083A3	Rear Escutcheon		2SC4627	Transistor
M22	YWV5EA0977A2	Upper Cover	Q4	2SC4619	Transistor or
M23	YWV5GA0114A4	Side Cap		2SC4627	Transistor
M24	YWV2TB0240A3	Mounting Bracket	Q6	2SK662-PQR	FET or
M26	YWV7MA0270A4	Safety Label		2SK853	Transistor
M28	YWV7SA1338A4	Side Label	Q7	2SB766-RS	Transistor
M29	YFV7MB0099A4	UL Caution Label	Q10	2SA1576	Transistor or
M30	YFV7QA0285A4	Main Label		2SB1218-QRS	Transistor
M32	YFV2NA0084A4	Spacer	Q12,13	2SC4617	Transistor
M33	YFV2PA0207A4	Insulator	Q13	2SD2216	Transistor
M35	YWV1KA0128A4	Washer	Q17	2SA1774	Transistor or
M37	YWV-BCG-EM01	Earth Lug		2SB1462	Transistor
			Q18	2SA1774	Transistor or
				2SB1462	Transistor
			Q19	2SC4617	Transistor or
				2SD2216	Transistor
			Q20	2SC4617	Transistor or
				2SD2216	Transistor
			Q21	2SC4617	Transistor or
				2SD2216	Transistor
			Q22	2SC4617	Transistor or
				2SD2216	Transistor
			Q23	2SA1774	Transistor or
				2SB1462	Transistor
			Q24	2SC4617	Transistor or
				2SD2216	Transistor
			Q27	2SD874-RS	Transistor
			Q30	2SB766-RS	Transistor
			Q33	2SA1774	Transistor or
				2SB1462	Transistor
			Q34	2SA1774	Transistor or
				2SB1462	Transistor
			Q35	2SA1774	Transistor or
				2SB1462	Transistor

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
Q36	25A1774	Transistor	R54,58	ERJ3GEYJ103	Carbon 10K ohms 1/16W
	25B1462	Transistor or	R61,63	ERJ3GEYOR00	Carbon 0 ohms 1/16W
	25D2216	Transistor or	R66,68	ERJ3GEYOR00	Carbon 0 ohms 1/16W
Q38	25C4617	Transistor	R70	ERJ3GEYOR00	Carbon 0 ohms 1/16W
Q39	25A1774	Transistor or	R72	YWR0816P302D	Metal 3K ohms 1/16W
	25B1462	Transistor			
D1	YWDA121	Diode or	R76	ERJ3GEYJ101	Carbon 100 ohms 1/16W
	MA132K	Diode	R77	YWR0816P242D	Metal 2.4K ohms 1/16W
D2	YWDA221	Diode or	R78	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	MA133	Diode	R79	YWR0816P332D	Metal 3.3K ohms 1/16W
D4	YWDA221	Diode or	R80	YWR0816P222D	Metal 2.2K ohms 1/16W
	MA133	Diode	R82	ERJ3GEYOR00	Carbon 0 ohms 1/16W
D5	YWD211	Diode or	R84	ERJ3GEYJ103	Carbon 10K ohms 1/16W
	MA8110	Diode	R85	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
D6	YWD220	Diode or	R86	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
	MA8200	Diode	R87,88	ERJ3GEYJ101	Carbon 100 ohms 1/16W
D7,8	MA372	Diode	R89	ERJ3GEYJ102	Carbon 1K ohms 1/16W
D11	YWDA121	Diode or	R90-92	ERJ3GEYJ101	Carbon 100 ohms 1/16W
	MA132K	Diode	R94	ERJ3GEYJ102	Carbon 1K ohms 1/16W
D12	YWDA121	Diode or	R95	ERJ3GEYJ202	Carbon 2K ohms 1/16W
	MA132K	Diode	R96	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R1	ERJ3GEYJ912	Carbon 9.1K ohms 1/16W	R99	ERJ3GEYJ243	Carbon 24K ohms 1/16W
R2,3	ERJ3GEYJ911	Carbon 910 ohms 1/16W	R101	ERJ3GEYJ105	Carbon 1M ohms 1/16W
R4	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R104	ERJ3GEYJ104	Carbon 100K ohms 1/16W
R5,7	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	R109,112	ERJ3GEYOR00	Carbon 0 ohms 1/16W
R9	ERJ3GEYJ391	Carbon 390 ohms 1/16W	R113	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R10	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R114	ERJ3GEYJ620	Carbon 62 ohms 1/16W
R11	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R115	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R12	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R116	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
R13	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	R117	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R14	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R118	YWR0816P302D	Metal 3K ohms 1/16W
R15	ERJ3GEYJ331	Carbon 330 ohms 1/16W	R119	YWR0816P153D	Metal 15K ohms 1/16W
R16	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R120	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
R18	ERJ3GEYJ331	Carbon 330 ohms 1/16W	R121	ERJ3GEYJ100	Carbon 10 ohms 1/16W
R21	ERJ3GEYOR00	Carbon 0 ohms 1/16W	R122	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R22	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R123	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R24	ERJ3GEYJ302	Carbon 3K ohms 1/16W	R124	YWR0816P472D	Metal 4.7K ohms 1/16W
R26	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R125	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R27	ERJ3GEYOR00	Carbon 0 ohms 1/16W	R126	YWR0816P243D	Metal 24K ohms 1/16W
R29	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W	R127	YWR0816P103D	Metal 10K ohms 1/16W
R32	ERJ3GEYOR00	Carbon 0 ohms 1/16W	R130	YWR0816P242D	Metal 2.4K ohms 1/16W
R33,34	ERJ3GEYJ100	Carbon 10 ohms 1/16W	R131	YWR0816P153D	Metal 15K ohms 1/16W
R36	ERJ3GEYOR00	Carbon 0 ohms 1/16W	R134	ERJ3GEYJ104	Carbon 100K ohms 1/16W
R37	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R136	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R40,43	ERJ3GEYOR00	Carbon 0 ohms 1/16W	R137	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R44,45	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R139	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R48	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R140	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R49	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R141	ERJ3GEYJ154	Carbon 150K ohms 1/16W
R50	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R142	ERJ3GEYOR00	Carbon 0 ohms 1/16W
R51,52	ERJ3GEYOR00	Carbon 0 ohms 1/16W	R143	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R53	ERJ3GEYJ681	Carbon 680 ohms 1/16W	R144	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R145,146	YWR0816P103D	Metal 10K ohms 1/16W
			R147	ERJ3GEYJ560	Carbon 56 ohms 1/16W
			R148	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
			R153,154	ERJ3GEYOR00	Carbon 0 ohms 1/16W
			R155,156	ERJ3GEYJ473	Carbon 47K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
R159,160	ERJ3GEY0R00	Carbon	0 ohms 1/16W	C103	ECST1AD476ZR	Electrolytic	47 μ F 10V
R163	ERJ3GEYJ470	Carbon	47 ohms 1/16W	C105	YW5CH151J5VB	Ceramic	150 pF
R164	YWR0816P242D	Metal	2.4K ohms 1/16W	C106	YW5CH101J5VB	Ceramic	100 pF
R165	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C107	YW5CH120J5VB	Ceramic	12 pF
R166	ERJ3GEYJ470	Carbon	47 ohms 1/16W	C114	ECEV1CV470	Electrolytic	47 μ F 16V
R167	ERJ3GEYJ512	Carbon	5.1K ohms 1/16W	C115	ECEV1CV100	Electrolytic	10 μ F 16V
R213	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C117	ECEV1HV475P	Electrolytic	4.7 μ F 50V
R214	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W	C118-120	YW5X102K5VB	Ceramic	1000 pF
R215	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W	C123,124	YW5X102K5VB	Ceramic	1000 pF
R216	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W	C138	ECEV1CV470	Electrolytic	47 μ F 16V
R217	ERJ3GEYJ101	Carbon	100 ohms 1/16W	C144	ECEV1EV330	Electrolytic	33 μ F 25V
R219-221	ERJ3GEYJ102	Carbon	1K ohms 1/16W	L1,5	ELJFC8R2MF	Coil	8.2 μ H
R228	ERJ3GEYJ331	Carbon	330 ohms 1/16W	L6,10	ELJFC8R2MF	Coil	8.2 μ H
R229	ERJ3GEYJ821	Carbon	820 ohms 1/16W	L12	EIC4EJ004E	Coil	
R231	YWR0816P302D	Metal	3K ohms 1/16W	L15,18	ELJFC8R2MF	Coil	8.2 μ H
R232	YF2116101JT	Carbon	100 ohms 1/10W	L21	YWCD75391KC	Coil	39 μ H
R233	ERJ3GEY0R00	Carbon	0 ohms 1/16W	L22	YWNL32T21K	Coil	220 μ H
R237,238	ERJ6GEY0R00	Carbon	0 ohms 1/16W	CF1	ELB4B532	Filter	
C5,6	YW5CH100J5VB	Ceramic	10 pF	CN1	YW523961490	14-pin Connector	
C7	YW5X103K2VB	Ceramic	0.01 μ F	CN2	YW522051890	18-pin Connector	
C8	YW5S1102K5VB	Ceramic	1000 pF	CN3	YW522051490	14-pin Connector	
C9	YW5CH101J5VB	Ceramic	100 pF	CN4	YW31756356	Connector	
C10	YW5CH331J5VB	Ceramic	330 pF	CN7	YW522051890	18-pin Connector	
C12	YW5F104Z2VB	Ceramic	0.1 μ F	CN8,9	YW71756436	Connector	
C13	YW5CH331J5VB	Ceramic	330 pF	TP1	YWRC2125TPV	Test Point	
C14,15	YW5X103K2VB	Ceramic	0.01 μ F				
C16	YW5CH101J5VB	Ceramic	100 pF				
C19	YW5F104Z2VB	Ceramic	0.1 μ F				
C26	YF400224FZT	Ceramic	0.22 μ F				
C28	YW5X103K2VB	Ceramic	0.01 μ F				
C33,35	YF400104FZT	Ceramic	0.1 μ F				
C36	YF400104FZT	Ceramic	0.1 μ F				
C37	ECEV1CV470	Electrolytic	47 μ F 16V				
C38	ECEV1CV100	Electrolytic	10 μ F 16V				
C39	ECST1VY104ZR	Electrolytic	0.1 μ F 35V				
C40	YWK235A0R1R	Electrolytic	0.1 μ F 35V				
C41	ECST1DC106	Electrolytic	10 μ F 20V				
C43	ECST1CC106ZR	Electrolytic	10 μ F 16V				
C44,45	ECEV1CV100	Electrolytic	10 μ F 16V				
C46	ECEV1HV2R2	Electrolytic	2.2 μ F 50V				
C54	ECEV1CV470	Electrolytic	47 μ F 16V				
C56	ECST1CC106ZR	Electrolytic	10 μ F 16V				
C57	ECST1VD685	Electrolytic	6.8 μ F 35V				
C60	ECEV1CV100	Electrolytic	10 μ F 16V				
C62	ECEV1HV100SP	Electrolytic	10 μ F 50V				
C63	ECEV1EV220	Electrolytic	22 μ F 25V				
C68,70	ECEV1CV470	Electrolytic	7 μ F 16V				
C72	ECST0GY106	Electrolytic	10 μ F 4V				
C74	ECST1CY105ZR	Electrolytic	1 μ F 16V				
C77	YW5F473Z2VB	Ceramic	0.047 μ F				
C78	YW5X222K5VB	Ceramic	2200 pF				
C79,81	YW5F104Z2VB	Ceramic	0.1 μ F				
C82,83	ECEV1CV100	Electrolytic	10 μ F 16V				
C95	ECEV1CV470	Electrolytic	7 μ F 16V				

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
DIGITAL BOARD					
PCB2 (REL)	YWVKCL32E2A	Printed Circuit Board Assy	R38-41	ERJ3GEY1682	Carbon 6.8K ohms 1/16W
IC1	AN2015FAP	IC	R42-44	ERJ3GEY122	Carbon 1.2K ohms 1/16W
IC2,3	NJM4558M	IC	R45,46	ERJ3GEY0R00	Carbon 0 ohms 1/16W
IC6	YWCXD1175AM	IC	R47	ERJ3GEY122	Carbon 1.2K ohms 1/16W
IC7	YWM6M80021FP	IC	R48	ERJ3GEY101	Carbon 100 ohms 1/16W
IC8	MN6730FHP	IC	R50	ERJ3GEY122	Carbon 1.2K ohms 1/16W
IC9	MN6731FHP	IC	R53	ERJ3GEY0R00	Carbon 0 ohms 1/16W
IC10	MN18B166CUD	IC	R56	ERJ3GEY101	Carbon 100 ohms 1/16W
IC12	MN65701FHP	IC	R58,59	ERJ3GEY0R00	Carbon 0 ohms 1/16W
IC13	MN53020LB01	IC	R68,69	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q8	25C4617	Transistor or	R72,73	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q9	25D2216	Transistor	R76	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q10	25A1774	Transistor or	R77	ERJ3GEY100	Carbon 10 ohms 1/16W
Q11	25B1462	Transistor	R78,79	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q14	25A1774	Transistor or	R82,85	ERJ3GEY472	Carbon 4.7K ohms 1/16W
Q15	25B1462	Transistor	R94	ERJ3GEY472	Carbon 4.7K ohms 1/16W
Q16	25C4617	Transistor or	R95	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q17	25D2216	Transistor	R96	YWR0816P221D	Metal 220 ohms 1/16W
Q18-20	25D2216	Transistor or	R97	YWR0816P102D	Metal 1K ohms 1/16W
Q23	25C4617	Transistor or	R98	YWR0816Q560D	Metal 56 ohms 1/16W
Q26	25D2216	Transistor	R99	ERJ3GEY0R00	Carbon 0 ohms 1/16W
Q27	25C4617	Transistor or	R100,101	YWR0816P221D	Metal 220 ohms 1/16W
D2	25D2216	Transistor	R104	YWR0816P472D	Metal 4.7K ohms 1/16W
D3	25C4617	Transistor or	R105	YWR0816P562D	Metal 5.6K ohms 1/16W
D4	25D2216	Transistor	R106,113	ERJ3GEY472	Carbon 4.7K ohms 1/16W
TH215	YWDA221	Diode or	R114	ERJ3GEY103	Carbon 10K ohms 1/16W
R9	MA133	Diode	R115	ERJ3GEY472	Carbon 4.7K ohms 1/16W
R19	YWDA221	Diode or	R116	ERJ3GEY271	Carbon 270 ohms 1/16W
R20	MA133	Diode	R117	ERJ3GEY472	Carbon 4.7K ohms 1/16W
R21	YWDA221	Diode or	R118-120	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R22	MA133	Diode	R122	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R23	L311F431J502	Thermistor	R123	ERJ3GEY105	Carbon 1M ohms 1/16W
R25	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	R133	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R28	ERJ3GEYJ473	Carbon 47K ohms 1/16W	R136-148	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R30	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R150-157	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R31	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R158	ERJ3GEY122	Carbon 1.2K ohms 1/16W
R33	ERJ3GEYJ112	Carbon 1.1K ohms 1/16W	R159	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R34,36	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R160	ERJ3GEY122	Carbon 1.2K ohms 1/16W
R37	ERJ3GEYJ391	Carbon 390 ohms 1/16W	R161	ERJ3GEY1682	Carbon 6.8K ohms 1/16W
			R162	ERJ3GEY122	Carbon 1.2K ohms 1/16W
			R163,164	ERJ3GEY1682	Carbon 6.8K ohms 1/16W
			R168-180	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R184,185	ERJ3GEY473	Carbon 47K ohms 1/16W
			R186	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R187	ERJ3GEY102	Carbon 1K ohms 1/16W
			R188	ERJ3GEY392	Carbon 3.9K ohms 1/16W
			R189	ERJ3GEY103	Carbon 10K ohms 1/16W
			R190	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R191	ERJ3GEY102	Carbon 1K ohms 1/16W
			R192	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
			R193	ERJ3GEYJ821	Carbon 820 ohms 1/16W
			R194	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
			R196	ERJ3GEYJ2R2	Carbon 2.2 ohms 1/16W
			R197	ERJ3GEYJ221	Carbon 220 ohms 1/16W
			R198	ERJ3GEYJ103	Carbon 10K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
R199	ERJ3GEYJ181	Carbon 180 ohms 1/16W	C84-86	ECST1AC226	Tantalum 22 μ F 10V
R214	ERJ3GEYJ104	Carbon 100K ohms 1/16W	C87	ECST0JB106ZR	Tantalum 10 μ F 6.3V
Z1-6	EXB8BV470J	Block Resistor	C88	ECST1AC106	Tantalum 10 μ F 10V
C3	YW5F473Z2VB	Ceramic 0.047 μ F		YWK210C100R	Electrolytic 10 μ F 10V
C6-8	YW5CH120J5VB	Ceramic 12 pF	C90,91	ECST1AB106	Tantalum 10 μ F 10V
C9	YW5CH151J5VB	Ceramic 150 pF	C92	ECST1AD476ZR	Tantalum 47 μ F 10V
C10	YW5CH101J5VB	Ceramic 100 pF	C93	YW5F104Z2VB	Ceramic 0.1 μ F
C12	YW5CH120J5VB	Ceramic 12 pF	C96	ECST1AY475	Tantalum 4.7 μ F 10V
C15	YW5CH330J5VB	Ceramic 33 pF	L1,2	ELJFC8R2MF	Coil 8.2 μ H
C16	YW5CH151J5VB	Ceramic 150 pF	L4,7	ELJFC8R2MF	Coil 8.2 μ H
C17	YW5X102K5VB	Ceramic 1000 pF	L8,10	ELJFC8R2MF	Coil 8.2 μ H
C18	YW5CH120J5VB	Ceramic 12 pF	L11,13	ELJFC8R2MF	Coil 8.2 μ H
C20	YW5CH150J5VB	Ceramic 15 pF	L14,25	ELJFC8R2MF	Coil 8.2 μ H
C21	YW5CH101J5VB	Ceramic 100 pF	L30	ELJFC8R2MF	Coil 8.2 μ H
C22	YW5CH151J5VB	Ceramic 150 pF	X1	EF0V8004E0A	Crystal Oscillator
C23	YW5F104Z2VB	Ceramic 0.1 μ F	CF4	ELB4A512	Filter
C27,29	YW5CH101J5VB	Ceramic 100 pF	CF5	EIK4EW001T	Filter
C32,35	YW5F104Z2VB	Ceramic 0.1 μ F	CF6	EIK4EW002T	Filter
C36	YW400474Z	Ceramic 0.47 μ F	CN1,2	YW71756436	16-pin Connector
C37	YW5F104Z2VB	Ceramic 0.1 μ F	CN3,4	YW523961890	18-pin Connector
C38-40	YW5CH120J5VB	Ceramic 12 pF	CN5,6	YW31756316	6-pin Connector
C45	YW5F104Z2VB	Ceramic 0.1 μ F	R201,204	ERJ6GEY0R00	Jumper Resistor
C46,47	YF400104FZT	Ceramic 0.1 μ F	R206-213		
C48	ECST0JY335	Tantalum 3.3 μ F 6.3V			
C49,50	YF400103XKT	Ceramic 0.01 μ F			
C56	ECST0JY475	Tantalum 4.7 μ F 6.3V			
C57	ECST0JY685	Tantalum 6.8 μ F 6.3V			
C58	ECST1AB106	Tantalum 10 μ F 10V			
C59	ECST0GB226ZR	Tantalum 22 μ F 4V			
C60	ECST0JY475	Tantalum 4.7 μ F 6.3V			
C61	ECST0GY475Z	Tantalum 4.7 μ F 4V			
C62	ECST1DC685ZR	Tantalum 6.8 μ F 20V			
C63	ECST1CB475ZR	Tantalum 4.7 μ F 16V			
C64	ECST1AD476ZR	Tantalum 47 μ F 10V			
C65	ECST1VY104ZR	Tantalum 0.1 μ F 35V or			
C67	YWK235A0R1R	Electrolytic 0.1 μ F 35V			
	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Electrolytic 10 μ F 10V			
C69	ECST1AB106	Tantalum 10 μ F 10V			
C70	ECST0GY106	Tantalum 10 μ F 4V			
C71	ECST1AB106	Tantalum 10 μ F 10V			
C72	ECST1CC106ZR	Tantalum 10 μ F 16V			
C73	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Electrolytic 10 μ F 10V			
C75	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Electrolytic 10 μ F 10V			
C77	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Electrolytic 10 μ F 10V			
C78	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Electrolytic 10 μ F 10V			
C80	ECST1AC106	Electrolytic 10 μ F 10V or			
	YWK210C100R	Electrolytic 10 μ F 10V			
C82	ECEV1CV100	Electrolytic 10 μ F 10V			
C83	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Electrolytic 10 μ F 10V			

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
SYNC/ENCODER BOARD					
PCB3 (RTL)	YWVKDC132E2A	Printed Circuit Board Assy	R30	ERJ3GEY0R00	Carbon 0 ohms 1/16W
IC4	AN2254FAP	LSI	R32	ERJ3GEYJ102	Carbon 1K ohms 1/16W
IC5	YWM62352GP	IC	R33	ERJ3GEYJ511	Carbon 510 ohms 1/16W
IC7	MN73069LBM2	IC	R34,35	ERJ3GEYJ102	Carbon 1K ohms 1/16W
IC8	NJM2903M	IC	R37	ERJ3GEYJ561	Carbon 560 ohms 1/16W
IC9	YWTC7532FR	IC			
IC10	YWTC4569F	IC	R39	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
IC11,12	YWTC7504F	IC	R41,43	ERJ3GEYJ221	Carbon 220 ohms 1/16W
Q2,3	2SK662-PQR	FET	R44	ERJ3GEYJ182	Carbon 1.8K ohms 1/16W
Q7	2SK853	Transistor	R45,46	ERJ3GEYJ102	Carbon 1K ohms 1/16W
Q10	2SA1774	Transistor or	R47	ERJ3GEYJ221	Carbon 220 ohms 1/16W
	2SB1462	Transistor	R48,50	ERJ3GEYJ102	Carbon 1K ohms 1/16W
Q11	2SA1774	Transistor or	R51,52	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SB1462	Transistor	R56	ERJ3GEYJ334	Carbon 330K 1/16W
Q29	2SC4617	Transistor or	R58	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
	2SD2216	Transistor	R59	ERJ3GEYJ104	Carbon 100K ohms 1/16W
Q45	UMX1	Transistor or	R62	ERJ3GEYJ105	Carbon 1M ohms 1/16W
	XP4501	Transistor	R63	ERJ3GEYJ823	Carbon 82K ohms 1/16W
Q46	2SC4617	Transistor or	R66,67	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SD2216	Transistor	R70	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q47	2SA1774	Transistor or	R71	ERJ3GEYJ105	Carbon 1M ohms 1/16W
	2SB1462	Transistor	R73	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q48	2SA1774	Transistor or	R74,75	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SB1462	Transistor	R77	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q49	2SC4617	Transistor or	R79	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	2SD2216	Transistor	R80	YWR0816P331D	Metal 330 ohms 1/16W
Q50	UMZ1	Transistor or	R82	ERJ3GEYJ821	Carbon 820 ohms 1/16W
	XP4601	Transistor	R83	ERJ3GEYJ102	Carbon 1K ohms 1/16W
D1	YWDA120	Diode or	R84	YWR0816P681D	Metal 680 ohms 1/16W
	MA132A	Diode	R85	ERJ3GEYJ103	Carbon 10K ohms 1/16W
D2-7	MA372	Diode	R86	ERJ3GEYJ334	Carbon 330K 1/16W
D8,9	MA729	Diode	R88	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W
D10	YWDA120	Diode or	R89	ERJ3GEY0R00	Carbon 0 ohms 1/16W
	MA132A	Diode	R90	ERJ3GEYJ113	Carbon 11K ohms 1/16W
D11	YWDA120	Diode or	R91	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	MA132A	Diode	R92	ERJ3GEYJ912	Carbon 9.1K ohms 1/16W
R1	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	R95	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R3	ERJ3GEYJ183	Carbon 18K ohms 1/16W	R97	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R9	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R102	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R10	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R103	ERJ3GEYJ391	Carbon 390 ohms 1/16W
R11,12	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R107	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R13	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R110	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R14	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R112	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
R16	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R113	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R17	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R120,123	ERJ3GEY0R00	Carbon 0 ohms 1/16W
			R124,129	ERJ3GEY0R00	Carbon 0 ohms 1/16W
R18	ERJ3GEYJ184	Carbon 180K ohms 1/16W	132	L311F431J502	Thermistor
R19	ERJ3GEYJ223	Carbon 22K ohms 1/16W	R144	ERJ3GEYJ223	Carbon 22K ohms 1/16W
R21-24	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R148	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W
R27	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R163	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R28,29	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R166	ERJ3GEYJ561	Carbon 560 ohms 1/16W
			R167	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W

REF.NO.	PART NO	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
R168	ERJ3GEYJ202	Carbon 2K ohms 1/16W	C66	ECST1AC106	Tantalum 10 μ F 10V or
R170	ERJ3GEYOR00	Carbon 0 ohms 1/16W	YWK210C100R	Tantalum 10 μ F 10V	
R176,179	YWR0816P471D	Metal 470 ohms 1/16W	C67	ECEV1EV220	Tantalum 22 μ F 25V
R182	YWR0816P302D	Metal 3K ohms 1/16W	C69	ECST0JB1062R	Tantalum 10 μ F 6.3V
R183	YWR0816P751D	Metal 750 ohms 1/16W	C71	ECST1AC156	Tantalum 15 μ F 10V
R187	ERJ3GEYOR00	Carbon 0 ohms 1/16W	C73	ECST1AC106	Tantalum 10 μ F 10V or
R188	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	YWK210C100R	Tantalum 10 μ F 10V	
R189	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C74	ECST1CY105ZR	Tantalum 1 μ F 16V
R190	ERJ3GEYJ393	Carbon 39K ohms 1/16W	C75	ECST1AY252ZR	Tantalum 2.2 μ F 10V
R191	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	C76	ECST1AC156	Tantalum 15 μ F 10V
R192	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C77	ECST1VY224Z	Tantalum 0.22 μ F 35V or
R193	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	YWK235AR22R	Tantalum 0.22 μ F 35V	
R194	ERJ3GEYJ393	Carbon 39K ohms 1/16W	C78	ECST1AC156	Tantalum 15 μ F 10V
R195	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	C79	ECST0GC336ZR	Tantalum 33 μ F 4V or
R196	ERJ3GEYJ113	Carbon 11K ohms 1/16W	YWK24C330R	Tantalum 33 μ F 4V	
R198	ERJ3GEYJ101	Carbon 100 ohms 1/16W	C81	ECST1CC106ZR	Tantalum 10 μ F 16V or
R199,200	ERJ3GEYOR00	Carbon 0 ohms 1/16W	YWSK1C106KRC	Tantalum 10 μ F 16V	
R203	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W	C82	ECST1CC106ZR	Tantalum 10 μ F 16V or
R204	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	YWSK1C106KRC	Tantalum 10 μ F 16V	
R205	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C83	ECEV1CV100	Tantalum 10 μ F 16V
R206,210	ERJ3GEYOR00	Carbon 0 ohms 1/16W	C86	YW5CH101J5VB	Ceramic 100 pF
R212	ERJ3GEYOR00	Carbon 0 ohms 1/16W	C87	YW5F104Z2VB	Ceramic 0.1 μ F
R213	ERJ3GEYJ104	Carbon 100K ohms 1/16W	C88	ECEV1CV100	Tantalum 10 μ F 16V
R214,215	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	C89	ECST1CY105ZR	Tantalum 1 μ F 16V
R216	ERJ3GEYJ151	Carbon 150 ohms 1/16W	C90	YW5F104Z2VB	Ceramic 0.1 μ F
R217	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C91	YW5CH510J5VB	Ceramic 51 pF
R218	ERJ3GEYJ221	Carbon 220 ohms 1/16W	C92	ECST1CY105ZR	Tantalum 1 μ F 16V
R219	ERJ3GEYJ751	Carbon 750 ohms 1/16W	C93	ECEV1CV100	Tantalum 10 μ F 16V
C1	YF400104FZT	Ceramic 0.1 μ F	C94	ECST1ED106ZR	Tantalum 10 μ F 25V
C2	YW5CH120J5VB	Ceramic 12 pF	C95,97	ECEV1CV470	Tantalum 47 μ F 16V
C4,5	YW5CH151J5VB	Ceramic 150 pF	C98	YF400224FZT	Ceramic 0.22 μ F
C6	YW5F104Z2VB	Ceramic 0.1 μ F	C99	YW5F104Z2VB	Ceramic 0.1 μ F
C7	YW5CH121J5VB	Ceramic 120 pF	C100	YW5CH221J5VB	Ceramic 220 pF
C8	YW5X103K2VB	Ceramic 0.01 μ F	L1,3	ELJFCB82MF	Coil 8.2 μ H
C9	YW5CH910J5VB	Ceramic 91 pF	L5	ELC4EJ003E	Coil
C10	YW5CH750J5VB	Ceramic 75 pF	L7-11	ELJFCB82MF	Coil 8.2 μ H
C11,12	YF400104FZT	Ceramic 0.1 μ F	X1	YWDX17R734	Crystal Oscillator
C17	YW5CH331J5VB	Ceramic 330 pF	X2	YWDX14R187	Crystal Oscillator
C18	YW5F104Z2VB	Ceramic 0.1 μ F	CF3	ELB4D537	Filter
C19	YF400104FZT	Ceramic 0.1 μ F	CF6	YWNL4532S4R4	Filter
C21	YW5CH271J5VB	Ceramic 270 pF	CN1,2	YW41756386	16-pin Connector
C22	YW5CH331J5VB	Ceramic 330 pF	CN3	YW523961490	14-pin Connector
C23	YW5CH271J5VB	Ceramic 270 pF	TP1-3	YWRCT2125TPV	Test Point
C24,25	YW5X103K2VB	Ceramic 0.01 μ F	TP7	YWRCT2125TPV	Test Point
C26	YW5CH270J5VB	Ceramic 27 pF			
C28	YW5X103K2VB	Ceramic 0.01 μ F			
C32,33	YF426104XKS	Ceramic 0.1 μ F			
C34,35	YW5F104Z2VB	Ceramic 0.1 μ F			
C45	YW5X103K2VB	Ceramic 0.01 μ F			
C46	YW400393XKT	Ceramic 0.039 μ F			
C47-52	YF400104FZT	Ceramic 0.1 μ F			
C53	ECST0JY335	Electrolytic 3.3 μ F 6.3V			
C54,56	YF400104FZT	Ceramic 0.1 μ F			
C64	ECST1AC106	Tantalum 10 μ F 10V or			
	YWK210C100R	Tantalum 10 μ F 10V			

REF.NO.	PART NO.	DESCRIPTION
REAR BOARD		
PCB4 (RTL) D1 R1 C1 C2,3	YWVKYL322P2A LN277RPX ERD52TJ751 RPE132F104Z ECEA0JK5331	Printed Circuit Board Assy LED Carbon 750 ohms 1/4W Ceramic 0.1 μ F Electrolytic 330 μ F 6.3V
C4 C5 SW1 CN1 CN101	ECEA0JU471 ECKF1H222MD YFKSD04 YW51746430 YWHXC0325900	Electrolytic 470 μ F 6.3V Ceramic 2200 pF 50V Slide Switch 20-pin Connector BNC Connector
E1 E101 M25	YWLH53 YF40S18YF2P YFV2NA0071A4	Spacer 2-pin Terminal Spacer

ALC BOARD

PCB5 C3-5 C6 L1-4 SW1	YWVRYCL32P3B YWSX102K5VB YWSF104Z2VB ELJFCR68MF SS5342L4N	Printed Circuit Board Assy Ceramic 1000 pF Ceramic 0.1 μ F Coil Slide Switch
CN1 CN102 M9	YW1746366 YFD4151N200 YVW25A1859A4	Connector Connector Mounting Angle

POWER BOARD

PCB6 (RTL) IC1 IC2 Q1 Q101	YWVKYCL32P8A M5237L YWTC4511F 25K612 25B941-PQR	Printed Circuit Board Assy IC IC FET Transistor
D1 D2,3 R1 R2 R3	SS1.5J4 YWF1H4TP ERJ3GEYJ221 ERJ3GEYJ471 ERJ3GEYJ223	Diode Diode Carbon 220 ohms 1/16W Carbon 70 ohms 1/16W Carbon 22K ohms 1/16W
R4 R6 R20 VR1	ERJ3GEY0R00 ERJ3GEYJ332 ERJ3GEYJ104 EVM7J5W30B53	Carbon 0 ohms 1/16W Carbon 3.3K ohms 1/16W Carbon 100K ohms 1/16W Variable Resistor 5K ohms

REF.NO.	PART NO.	DESCRIPTION
C1 C2 C3 C5 C6,7	YWSX102K5VB ECST1VX105ZR YWSF104Z2VB YW400A123XKS ECEA1KEG101	Ceramic 1000 pF Electrolytic 1 μ F 35V Ceramic 0.1 μ F Ceramic 0.12 μ F Electrolytic 100 μ F 25V
C9 C11 C12 L1 T1	ECEA1AGE221 ECEA1EGE101 ECEA1AF5331 YW664D101K ETE11K10AY	Electrolytic 220 μ F 10V Electrolytic 100 μ F 25V Electrolytic 100 μ F 10V Coil 100 μ H Power Transformer
CN1 CN2,3 CN4 F1 TP1	YW21746360 YW11746356 EMCS0350Z YWS5FR1A YWRCT2125TPV	20-pin Connector 16-pin Connector 3-pin Connector Current Fuse 1A Test Point
M15 M16	YVW25A1860A4 YVW7DA0242A4	Mounting Angle Heat Sink

ACCESSORY PARTS/PACKAGING PARTS

CN110 M41 M42 M43 M45	YFE4191J100 YVW8QA2848AN YWT050803 YVW75A1450A4 YWT20X35C03	ALC Connector Operating Instructions Polyethylene Bag Caution Label Polyethylene Bag
M46	YVW9CA1851AN	Packaging Assy

REF.NO.	PART NO.	DESCRIPTION
COLOUR CCTV CAMERA WV-CL324		
MISCELLANEOUS		
FB1	YWCL320	Flexible Board
CN1	YWHXC0325900	BNC Connector
E101	YW40S18YF3P	3-pin Terminal
M1	YWV5BA0082A2	Front Escutcheon
M2	YWVAKA0920AN	Head Optical Assy
M3	YWV2SA1851A1	Main Mounting Angle
M4	YWV4JA0262A4	Spring
M5	YWV1EA0127A4	Special Screw
M6	YWV1EA0128A4	Special Screw
M7	YWV3FA0101A3	Ring
M8	YWBC-2B	Body Cap
M10	YWV5WB1194A4	Right Side Panel
M11	YWV5WA1195A4	Left Side Panel
M12	YWV5EA0976A2	Bottom Cover
M13	YWV2HA0970B2	Shield Parts
M14	YWV5KA1126A2	Case
M15	YWV6EA0142A3	Lid
M18	YWV2KA0655B2	Rear Chassis
M19	YWV5WA1201A4	Rear Panel
M20	YWV5BA0083A3	Rear Escutcheon
M22	YWV5EA0975A2	Upper Cover
M23	YWV5GA0114A4	Cap
M24	YWV2TB0240A3	Mounting Bracket
M25	YWV2NA0199A4	Spacer
M26	YWV7MA0270A4	Safety Label
M27	YWV7SA1197A4	Fuse Label
M28	YWV7SA1338A4	Label
M29	YFV7MB0099A4	UL Safety Label
M30	YWV7QA2856A4	Main Label
M35	YWV1KA0128A4	Washer
M37	YWV7MA0297A4	Safety Label

REF.NO.	PART NO.	DESCRIPTION
DRIVE BOARD		
PCB1	YVWKBC132E1A	Printed Circuit Board Assy
Refer to replacement parts list for WV-CL320		
DIGITAL BOARD		
PCB2	YVWKCC132E1A	Printed Circuit Board Assy
Refer to replacement parts list for WV-CL320		
SYNCH / ENCODER BOARD		
PCB3	YVWKDC132E1A	Printed Circuit Board Assy
Refer to replacement parts list for WV-CL320		
REAR BOARD		
PCB4 (REL)	YVWKYL324P2A	Printed Circuit Board Assy
D1	LN277RPX	LED
R1	ERDS2TJ751	Carbon 750 ohms 1/4W
VR1	EVML1GA00B14	Variable Resistor 10K ohms
C1	RPE132F104Z	Ceramic 0.1 μ F
C2,3	ECEA0JKS331	Electrolytic 330 μ F 6.3V
C4	ECEA0JU471	Electrolytic 470 μ F 6.3V
CS,6	ECKF1H222MD	Ceramic 2200 pF 50V
SW1	YFKSD04	Slide Switch
CN1	YW41746436	16-pin Connector
CN101	YWHXC0325900	BNC Connector
E101	YW40S18YF3P	3-pin Terminal
E1	YWLH53	Spacer
M25	YWV2NA0199A4	Spacer
ALC BOARD		
PCB5	YVWRYCL32P3B	Printed Circuit Board Assy
Refer to replacement parts list for WV-CL320		

REF.NO.	PART NO.	DESCRIPTION
POWER BOARD		
PCB6 (RTL)	YWVKYCL32P7A	Printed Circuit Board Assy
Q1	Z5C3568KL	Transistor
Q2	Z5D471KLA	Transistor
D3	1SS55	Diode
D4	YWF1H4TP	Diode
D7	DZ5B40	Diode
D8	YWWRD4.3EB12	Diode
R1	ERJ8GCSG153	Carbon 15K ohms 1/8W
R2	ERD50VJ333	Carbon 33K ohms 1/2W
R3,4	ERJ8GCSG151	Carbon 150 ohms 1/8W
R5	ERJ8GCSG821	Carbon 820 ohms 1/8W
R7	ERJ8GCSJ471	Carbon 470 ohms 1/8W
C1	ECQV1H474JZ	Plastic 0.47 μ F 50V
C2	ECQV1H683JM	Mica Capacitor 0.068 μ F 50V
C3	ECQV1H333KM	Plastic 0.033 μ F 50V
C5	DE7100F222MV	Ceramic 2200 pF
C6	ECEA1HGE101	Electrolytic 100 μ F 50V
C7	ECEA1HGE010	Electrolytic 1 μ F 50V
C14	ECEA1HGE101	Electrolytic 100 μ F 50V
T1	YWSU9V07010	Power Transformer
T2	ETE19K89AY	Power Transformer
F1	XBA1C20NU100	Current Fuse 2A 125V
CN1	EMCS0250Z	2-pin Connector
E1,2	S-NS057	Fuse Holder
M16	YVW7DA0284A4	Heat Sink

POWER SUB BOARD

PCB7 (RTL)	YWVKYL324P5A	Printed Circuit Board Assy
IC1	YWUPC1093J	IC
Q6,7	YWPS2501-1KA	Transistor
D1-3	YWF1H4TP	Diode
R17-20	ERJ8GCSJ912	Carbon 9.1K ohms 1/8W
R21	ERJ8GCSG271	Carbon 270 ohms 1/8W
R22	ERJ8GCSJ471	Carbon 470 ohms 1/8W
R23	ERJ8GCSJ392	Carbon 3.9K ohms 1/8W
R24	ERJ8GCSJ222	Carbon 2.2K ohms 1/8W
R25	ERJ8GCSG151	Carbon 150 ohms 1/8W
R26	ERJ8GCSG302	Carbon 3K ohms 1/8W
C11	YF426332SLJS	Ceramic 3300 pF
C19	ECEA1CGE101	Electrolytic 100 μ F 16V
C20	ECEA1EGE101	Electrolytic 100 μ F 25V
C22	ECEA1AGE221	Electrolytic 220 μ F 10V
C23	ECA1HX5010	Electrolytic 1 μ F 50V
E1	JM18LH04AAT	4-pin Connector
E2	JM16LH04AAT	4-pin Connector
CN1	YW11746360	10-pin Connector

REF.NO.	PART NO.	DESCRIPTION
ACCESSORY PARTS/PACKAGING PARTS		
CN110	YFE4191J100	ALC Lens Connector
M41	YVW8QA2848AN	Operating Instructions
M43	YWT050803	Polyethylene Bag
M45	YWT20X35C03	Polyethylene Bag
M46	YVW9CA1852AN	Packaging Assy
M48	YVW8FA0140A4	Packaging Label

Parts Change Notice

Model No. WV-CL320 Series

Subject : Change of Microprocessor

Effective From : Serial No. 38B00001

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.
If new part numbers are shown, be sure to use them when ordering parts

Reason for Change		+ The circled item indicates the reason			
① Improve performance		The microprocessor on the Digital board has been changed to improve the ATW function.			
2. Change of material or dimension					
3. To meet approved specification					
4. Standardization					
5. Addition					
6. Deletion					
7. Correction					
8. Other					
Interchangeability Code		++ The circled item indicates the interchangeability. If no marking, see the Notice in the bottom column *			
Parts	Set Production				
A Original	Early	Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.			
New	Late				
B Original	Early	Original parts may be used in early or late production set only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.			
New	Late				
③ Original	Early	New parts only may be used in early or late production sets. Stock new parts.			
New	Late				
D Original	Early	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.			
New	Late				
E Other					
Part Number		Parts identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by ○ mark are new parts used from this Parts Change Notice.			
Ref No.	Original Part No.	New Part No.	Notes (+, ++)	Part Name & Descriptions	Price
IC10	MN188166CUD	MN188166CUH	1, C	Microprocessor on the Digital board for WV-CL320/A, /B, /C /G and WV-CL324E.	
IC10	MN188166CUD	MN188166CUM1	1, C	Microprocessor on the Digital board for WV-CL322E.	

File this Parts Change Notice with your copy of the Service Manual

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Parts Change Notice

Subject : Correction of Parts Change Notice
Model No. WV-CL320/CL350 Series
Effective From : Serial No. 22B00001

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.

If new part numbers are shown, be sure to use them when ordering parts

Reason for Change		+ The circled item indicates the reason	
1. Improve performance			
2. Change of material or dimension			
3. To meet approved specification			
4. Standardization			
5. Addition			
6. Deletion			
⑦ Correction			
8. Other			

Interchangeability Code		++ The circled item indicates the interchangeability. If no marking, see the Note in the bottom column *	
Parts	Set Production		
A	Original  Early New  Late		Original or new parts may be used in early or late production sets. Use original parts until exhausted, then stock new parts.
B	Original  Early New  Late		Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.
C	Original  Early New  Late		New parts only may be used in early or late production sets. Stock new parts.
D	Original  Early New  Late		Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.
⑤	Other		

Part Number		Parts identified by ■ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by ○ mark are new parts used from this Parts Change Notice.			
Ref. No.	Original Part No.	New Part No.	Notes (+, -)	Part Name & Descriptions	Price
MISCELLANEOUS					
C22	ECEA1AKG101	ECA1AKF820	1, C	Electrolytic 82 μ F / 10V	
C25	ECEA1AKG101	ECA1AKF820	1, C	Electrolytic 82 μ F / 10V	

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Parts Change Notice

Subject : Improvement of Performance

Model No. WV-CL320 Series

Effective From : Serial No. 56XXXXXX

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.
If new part numbers are shown, be sure to use them when ordering parts

Reason for Change		+ The circled item indicates the reason			
① Improve performance		The R134 on the Drive board has been changed to improve accuracy of the ALC circuit.			
2. Change of material or dimension					
3. To meet approved specification					
4. Standardization					
5. Addition					
6. Deletion					
7. Correction					
8. Other					
Interchangeability Code		++ The circled item indicates the interchangeability. If no marking, see the Note in the bottom column *			
Parts	Set Production				
A Original New	Early Late	Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.			
Ⓑ Original New	Early Late	Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.			
C Original New	Early Late	New parts only may be used in early or late production sets. Stock new parts.			
D Original New	Early Late	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.			
E Other					
Part Number		Parts identified by ■ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by ○ mark are new parts used from this Parts Change Notice.			
Ref. No.	Original Part No.	New Part No.	Notes (+, ++)	Part Name & Descriptions	Price
DRIVE BOARD					
R134	ERJ3GEYJ104	ERJ3GEYJ334	1, B	Resistor	

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